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REVISED REMEDIAL DESIGN WORK PLAN
OPERABLE UNIT 2
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY

4/05

Prepared for:

216 Paterson Plank Road Cooperating PRP Group

Prepared by:

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1.0 INTRODUCTION

On behalf of the 216 Paterson Plank Road Cooperating PRP Group (Group), Golder Associates Inc. (Golder) has prepared this Remedial Design Work Plan (RDWP) for the Second Operable Unit (OU-2) at the 216 Paterson Plank Road Site (Site) in Carlstadt, New Jersey. On August 12, 2002, the United States Environmental Protection Agency (USEPA) issued a Record of Decision (ROD) (USEPA, 1993) for the OU-2 that identified the selected final remedy for the fill and shallow groundwater above the clay layer underlying the Site. Groundwater contamination at deeper levels will be addressed as part of Operable Unit 3 (OU-3) in a subsequent remedy selection process. A Consent Decree lodged on July 14, 2004, with an effective date of September 30, 2004, provides for implementation of the OU-2 remedial action by the Group.

Pursuant to the Consent Decree, the RDWP is one of several pre-design submittals. Submittals of qualifications for the Group's Project Coordinator and Supervising Contractor, and an associated Quality Management Plan were previously provided to USEPA. By letter dated August 12, 2004, USEPA approved the Group's nomination of P. Stephen Finn as Project Coordinator and Golder Associates as the Supervising Contractor.

This RDWP has been prepared pursuant to the requirements set forth in the Consent Decree and establishes a framework for activities related to the remedial design of the OU-2 remedy. Specifically, the objectives of the RDWP, as defined in the Statement of Work (SOW) included as Appendix D to the Consent Decree, are as follows:

- Identify any data needs that must be fulfilled in order to complete the Remedial Design for OU-2;
- Describe the Remedial Design tasks and present an approach for the completion of the Remedial Design;
- Describe any approvals and institutional controls which will be needed to comply with the Consent Decree; and,
- Provide a schedule for the Remedial Design activities and a draft schedule for remedial action, operation and maintenance, and monitoring.

In addition, this RDWP presents the assignments and responsibilities of key personnel on the design team.

2.0 BACKGROUND

The 6-acre 216 Paterson Plank Road Site is a former chemical recycling and waste processing facility that ceased operation in 1980 and was placed on USEPA's National Priorities List (NPL) in 1983. The property is bordered to the southwest by Paterson Plank Road, to the northwest by Gotham Parkway, to the southeast by a trucking company, and to the northeast by Peach Island Creek as shown on Figure 1.

The following sections provide a brief overview of the major remedial activities conducted at the Site to date.

2.1 Previous Studies

A Remedial Investigation (Dames and Moore, 1990) was initiated in 1987, which evaluated soil and groundwater beneath the Site. Borings were advanced at 30 locations during the remedial investigation, and chemical analyses were performed on soil samples from 17 of these borings. In broad terms, the investigation revealed ground conditions comprising fill overlying a clay layer, which was in turn underlain by glacial till and bedrock. Fourteen shallow piezometers (P-1 to P-14), and seven shallow monitoring wells (MW-1S to MW-7S), were installed in the fill zone, along with three deeper monitoring wells (MW-2D, MW-5D, and MW-7D) as shown on Figure 2.

An initial Feasibility Study was conducted in 1989 by Environmental Resources Management, Inc. (ERM, 1989). The Feasibility Study evaluated remedial alternatives for the designated First Operable Unit (OU-1) comprising groundwater and soils/sludge above the clay layer.

A total of nine monitoring wells were installed off-property by Dames and Moore in 1989 pursuant to Project Operations Plan (POP) No. 8 (Dames and Moore, 1988). Five shallow monitoring wells were screened within the fill (MW-8S to MW-12S) and four deeper monitoring wells were installed (MW-8D, MW-11D, MW-12D, and MW-13D).

A deep bedrock monitoring well (MW-2R) was installed on the property by Dames and Moore in 1989 pursuant to POP No. 9 (Dames and Moore, 1988). Dames and Moore also excavated 23 test pits in July, 1989 to evaluate the nature of the fill material. The results are summarized in a report titled Final Report - Excavation of Test Pits (Dames and Moore, 1989).

A Baseline Risk Assessment (BRA) for the Site was conducted by Clement Associates (Clement, 1990) for the USEPA. The BRA followed USEPA guidance for conducting risk assessments current at the time and utilized the information primarily collected during the initial phase of the RI. USEPA subsequently selected an interim remedy for OU-1 in 1990 (See Section 2.2).

Following implementation of the interim remedy, and at the request of USEPA, a Focused Feasibility Study (FFS) was conducted by Golder for the final remedial action for the fill and shallow groundwater. The work was conducted pursuant to the Focused Feasibility Study Work Plan (Golder, 1995). The FFS also included an investigation of a distinct sludge area, which was presented in the Focused Feasibility Study Investigation Report (Golder, 1997) and a treatability study of sludge materials pursuant to a Treatability Study Work Plan (Golder, 1998). The FFS was finalized in April 2001 leading to USEPA's selection of a final remedy for fill and shallow groundwater in August, 2002, referred to as Operable Unit 2 (OU-2).

2.2 1990 Record of Decision – Operable Unit No. 1

USEPA issued a ROD dated September 14, 1990, selecting an interim remedy for OU-1 based on the Remedial Investigation, Feasibility Study, and the BRA. The ROD defined OU-1 as "contaminated soils and groundwater above the clay layer" and the selected remedy comprised the following major elements:

- Installation of a slurry wall around the entire Site;
- Installation of an infiltration barrier over the Site;
- Installation of a groundwater collection system, and extraction of groundwater from the OU-1 zone; and,
- Off-site treatment and disposal of extracted groundwater.

USEPA determined that the selected Interim Remedy would "reduce the migration of hazardous substances, pollutants and contaminants out of the first operable unit zone" and be "consistent with an overall remedy which will attain the statutory requirement for protectiveness."

The Interim Remedy was designed and implemented by the Group pursuant to an Administrative Order (Index No. II CERCLA - 00116) dated September 28, 1990. The Interim Remedy consists of the following:

1. A lateral containment wall comprising a soil-bentonite slurry wall with an integral high density polyethylene (HDPE) vertical membrane which circumscribes the property;

2. A horizontal "infiltration barrier" consisting of high density polyethylene (HDPE) covering the property;

3. A sheet pile retaining wall along Peach Island Creek;

4. An extraction system for shallow groundwater consisting of five extraction wells screened in the fill, which discharge to an above grade 10,000 gallon holding tank via an above grade header system; and,

5. A chain link fence that circumscribes the Site.

The design of the Interim Remedy is presented in the Interim Remedy Remedial Design Report (Canonie, 1991) and construction was undertaken between August, 1991 and June, 1992. As part of the Interim Remedy design, 18 soil borings were conducted to evaluate subsurface conditions in the vicinity of the proposed slurry wall. The Interim Remedy construction is documented in the Final Report - Interim Remedy for First Operable Unit (Canonie, 1992).

The Interim Remedy has been in operation since June 1992 and extracted groundwater is regularly shipped, via tanker trucks, to the DuPont Environmental Treatment (DET) facility, located in Deepwater, New Jersey, for treatment and disposal. Between March 1993 and March 1994, the extraction system was not operational because of pump fouling by free phase product (Canonie, 1993). Existing Site conditions are shown on Figure 2.

Maintenance and monitoring of the Interim Remedy are conducted pursuant to the USEPA approved Operations and Maintenance Plan (Canonie, 1991) and subsequent addenda approved by USEPA. The sample points and analytical parameters are described in the approved O&M Plan which formed part of the Interim Remedy Remedial Design Report (Canonie, 1991) as subsequently modified pursuant to USEPA's letters dated April 18, 1997 and September 29, 1999. The current O&M sampling program includes sampling of surface water points SW-01 through SW-04 quarterly for Target Compound List (TCL) volatile organic compounds (VOCs) and annually for TCL pesticides/PCBs and Target Analyte List (TAL) metals. Groundwater sampling is performed annually for off-property fill zone monitoring wells MW-8S, MW-9S, MW-10S, MW-11S, and MW-12S and till monitoring wells MW-5D, MW-7D, RMW-8D, RMW-11D, RMW-12D, and RMW-13D (refer to Figure 2) for full TCL and TAL parameters.

2.3 Geologic and Hydrogeologic Conditions

Previous on- and off-property investigations (Dames & Moore, 1990; Golder, 1997) indicate that the Site stratigraphy generally consists of the following geologic units, in decending depth order:

- Man-made fill, generally containing abundant and massive debris (thickness ranging from 3 to greater than 12 feet);
- A meadow mat of peat, organic silt and clay intermixed with sand (thickness ranging from 0 to 7feet);
- Marine organic grey fine sand and silt (with a relatively uniform thickness of 2 feet);
- Glaciolacustrine deposits including an upper varved clay and a lower massive red clay (thickness ranging from 0 feet to 30 feet);
- Glacial till (with variable thickness across Site); and,
- Brunswick shale bedrock (encountered at approximately 60 feet below ground surface).

During the previous investigations, numerous chemical constituents were detected in the Fill Area material, including volatile organic compounds (VOCs) such as benzene, tetrachloroethylene and toluene; semi-volatile organic compounds (SVOCs) which were generally polynuclear aromatic hydrocarbons (PAHs); a small number of pesticides such as aldrin and dieldrin; polychlorinated biphenyls (PCBs); and metals such as copper and lead.

The sludge area located within the eastern corner of the Site has been determined to be a "Hot Spot" covering about 4,000 square feet in area and consisting predominantly of sludge material and fine-grained soil with little debris. A surficial layer of fill, approximately 0.5 to 8 feet thick, overlies this sludge area, and the sludge includes the highest VOC and PCB concentrations detected anywhere on the property. The limits of the sludge area were defined during the Focused Feasibility Study Investigation (Golder, 1997) and are illustrated in Figures 2 through 4; the volume of the sludge Hot Spot is approximately 1,480 cubic yards.

The Site is underlain by the following three groundwater units in descending depth order:

- Shallow Water Bearing Fill Unit: The shallow water table above the clay unit;
- Till aquifer, which consists of the water-bearing unit within the till between the clay layer and the bedrock; and,

- Bedrock aquifer, which is used regionally for potable and industrial purposes.

Shallow groundwater within the fill is part of OU-2. Deeper groundwater is part of OU-3 and is addressed in detail in the Operable Unit 3 Investigation Report (Golder, 2003).

3.0 DESCRIPTION OF OU-2 REMEDY

The overall purpose of the OU-2 remedy is to provide long-term source control through a combination of treatment and containment. The specific Remedial Action Objectives for OU-2 as described in the ROD are to:

- Mitigate the direct contact risk and leaching of constituents from soil, fill material and sludge into the groundwater;
- Reduce the toxicity and mobility of the Hot Spot constituents via treatment;
- Provide hydraulic control and containment of the shallow aquifer on-site by maintaining an inward groundwater gradient; and,
- Perform remediation in a manner that may allow site re-use for certain limited commercial purposes.

The OU-2 Remedy is the final remedy for the soils (fill) at the Site and includes remediation of the sludge Hot Spot and improvements to the existing interim remedy (OU-1) for the remainder of the Fill Area. The major components of the Selected Remedy are briefly discussed below. Implementation of the remedy will be conducted to minimize impacts to Peach Island Creek during construction. During construction, groundwater and Peach Island Creek will continue to be protected by the existing slurry wall. Protection of Peach Island Creek will be a significant design and construction consideration and will, at a minimum, require design of erosion and sediment control systems.

3.1 Hot Spot In-Situ Treatment

In-Situ treatment of the sludge will be performed using the following technologies:

- Air Stripping
- Solidification/stabilization

Air stripping via soil mixing with air injection will be performed using large augers or paddles covered by a shroud. The soil/sludge will be mixed for approximately 2 hours consistent with the treatability study. To enhance volatilization and removal of constituents (primarily VOCs), air will be introduced and a negative pressure will be maintained within the shroud to capture VOCs released during mixing. Recovered VOCs will be treated using appropriate treatment technologies such as vapor phase activated carbon or a catalytic oxidizer. The air treatment

method will be determined during the design in order to meet emission standards. After completion of air stripping, cement and lime will be used as the solidification/stabilization agents and applied to the sludge at a rate of approximately 10 percent cement and 10 percent lime by weight as determined from the Treatability Study conducted as part of the Focused Feasibility Study Investigation (Golder, 1997, p. 27). These reagents will be introduced and mixed using augers or paddles to achieve thorough homogenization, consistent with the treatability study. The stabilization process and associated addition of reagents will increase the volume of soil. In the Treatability Study, following curing, the mixture of 10% cement and 10% lime by weight exhibited a volume expansion of 32%.

The limits of the sludge area based on the Focused Feasibility Study Investigation are shown on Figures 2 through 4. It is anticipated that air stripping and stabilization/solidification will extend horizontally beyond the limits of the identified sludge area on the order of 2 to 3 feet to ensure treatment of the entire sludge area. However, the actual extent of treatment beyond the sludge area will depend on subsurface conditions encountered, since the large debris present outside the sludge area precludes treatment. Treatment will extend through the sludge into the natural ground surface based on the cross-sections (Figures 3 and 4) i.e., 10-18 feet below existing ground surface. Mixing will be carried out on an overlapping grid pattern to ensure effective treatment of the entire sludge area.

Performance standards for hot spot treatment are described in Section 7.2.1. As detailed in the SOW, if appropriate performance standards for treatment, solidification and containment are not met during the Hot Spot treatment portion of the remedy, the Hot Spot will be removed. In the event Hot Spot removal is required, a design for the Hot Spot removal work will be submitted to the USEPA for approval.

3.2 Streambank Enhancements

The existing sheet pile bulkhead along Peach Island Creek, which protects the slurry wall in the riparian area, will be improved and upgraded. The principal design objective for the streambank enhancement is to provide improved stability, while avoiding adverse impacts to the existing slurry wall containment system.

Remedial design activities will consider improvements including, but not limited to, the following:

- Partial removal of the existing sheet pile wall, and establishing natural, vegetated sloped conditions;
- Partial removal of the existing sheet pile wall, and replacing it with a conventional gravity-type wall system (e.g., gabion or bin wall systems); and,
- Partial removal of the existing sheet pile wall, and installation of a new sheet pile wall.

The remedial design will integrate the proposed impermeable cap into the selected streambank enhancement alternative. The selected streambank enhancement may consist of a combination of the above alternatives, due to space constraints between the soil-bentonite slurry wall and the existing sheet pile wall.

Soil materials excavated as part of the streambank enhancement work will either be consolidated on Site beneath the proposed impermeable cap, or characterized and disposed off-site in accordance with applicable regulations.

3.3 Cover System

A cover will be installed over the entire Fill Area currently circumscribed by the existing slurry wall as shown on Figure 2. The cover will consist of a 2-foot thick "double containment" system, designed, constructed and maintained to meet the substantive requirements of RCRA Subtitle C (40 CFR 264.310). Two preliminary cover sections have been identified, a vegetated surface option and an asphalt surface option. Conceptual cross-sections for each system are illustrated in Figures 3 and 4 and feature "double containment" in both cases. In the vegetated option, the two containment layers are a geomembrane and a geosynthetic clay layer, and in the second option the asphalt layer and a geomembrane provide the two barriers. Alternate methods and materials, which provide equal or superior performance, may be considered during design. The basic components of each of the cover sections include a prepared subgrade, a drainage layer, and a double barrier system.

Prior to construction of the cover, the Site will be graded to provide adequate drainage, and proof-rolled to provide a suitable subgrade for cover construction. Grading will be minimized to the extent practical to limit disturbance of the existing ground surface. Fill generated from the streambank and groundwater extraction system enhancements may be used for grading purposes. Site drainage will be directed to Peach Island Creek consistent with existing conditions.

3.4 Upgrading Existing Groundwater Recovery System

The existing, interim groundwater recovery system, which consists of above-ground piping, and recovery wells screened in the Fill Area, will be improved. The existing system will be upgraded via installation of approximately six new extraction wells installed around the perimeter of the Site (see Figure 6). The wells and related header system piping and electrical wiring will be installed underground in clean utility corridors around the Site perimeter to maximize flexibility for future Site use. A geotextile will be placed within the utility corridor to separate the existing fill from clean imported soils. Excavated soils will be used as grading fill under the proposed cover or will be characterized and disposed off-Site in accordance with applicable regulations.

Extracted groundwater will be conveyed to a collection point for off-Site disposal. Disposal will be via sewer connection or tanker truck transport for treatment at the Bergen County POTW; or, tanker truck transport to a permitted commercial facility such as DuPont Environmental Treatment.

The goal of shallow groundwater extraction will be to maintain inward gradients across the slurry wall, except along Peach Island Creek where inward gradients are not possible. It should be noted that the groundwater levels outside the slurry wall are subject to seasonal fluctuations because of the shallow nature of the groundwater. As such, inward gradients over the entire year may not always be observed, particularly during drier periods when the levels are lowest outside the slurry wall. Since these periods are relatively short, they are unlikely to represent material reversal of gradients from the Site. Additional piezometers will be installed along the north, west and south sides of the Site, inside and outside of the slurry wall to monitor hydraulic gradients (see Figure 6). Existing monitoring wells and piezometers within the slurry wall that are no longer required will be decommissioned.

3.5 Institutional Controls

Institutional controls to restrict use of the property and otherwise ensure the continued effectiveness of the remedy will be implemented. The Group has secured the necessary access easement from the current property owner (the Borough of Carlstadt) to implement the remedy, and the easement also provides the Borough's approval to apply the required Deed Notice to the property upon completion of the remedy. The form of Deed Notice approved by USEPA and the Borough is included as Appendix F to the Consent Decree.

4.0 EVALUATION OF SLURRY WALL PERFORMANCE

The Operations and Maintenance Plan (O&M Plan) for OU-1 requires ongoing monitoring of the groundwater and surface water conditions at the Site. Groundwater levels inside and outside the slurry wall are monitored quarterly, shallow groundwater outside the slurry wall is analyzed annually for Target Compound List (TCL) and Target Analyte List (TAL) parameters, and surface water from Peach Island Creek is analyzed quarterly for VOCs and annually for TCL and TAL parameters. These programs have been in place since 1992 and provide a substantial performance database. Extraction well pumping volumes, as expressed in volume shipped for off-Site treatment over time (taken from O&M Reports) are plotted in Figure 7.

Water Levels

Shallow monitoring wells are situated both on and off property. Water levels within the slurry wall are monitored in piezometers P-2, P-3, P-4, P-5, P-6, P-8, P-9R and P-14. Water levels in the adjacent fill, outside the slurry wall, are monitored in piezometers P-10 and P-11 and in monitoring wells MW-8S, MW-9S, MW-10S, MW-11S and MW-12S. Groundwater has been lowered on the average by more than 3 feet within the Fill Area since OU-1 groundwater extraction commenced in mid-June, 1992 and the data indicate that inward gradients across the slurry wall have been maintained, except along Peach Island Creek where the gradient is towards the creek. These data suggest that the slurry wall, in conjunction with the infiltration barrier and groundwater extraction system, is maintaining hydraulic control.

Shallow groundwater constituent concentrations outside the Fill were monitored quarterly from 1992-1999 and annually since 2000 as approved by USEPA. The samples are analyzed for the Contract Lab Program (CLP) analyte list which comprises the Target Compound List (Volatile Organic Compounds [VOCs], Semi-Volatile Organic Compounds [SVOCs] and pesticides and polychlorinated biphenyls [PEST/PCBs]) and the Target Analyte List (metals and cyanide).

Groundwater and Surface Water VOCs

VOCs are more mobile than most other target list compounds in groundwater and are therefore a good indicator of constituent mobility. Appendix A Table 1 provides the measured VOC concentrations, in µg/L, taken from off-site shallow fill monitoring wells over the monitoring period. Low levels of VOCs have been sporadically detected in the shallow fill monitoring wells. In 77% of the samples collected (124 of 161 samples), VOCs were either non-detect or consisted of only methylene chloride and/or acetone. Methylene chloride and acetone are common laboratory

contaminants and have historically been detected in the blanks. Of the remaining 37 samples, there have been only seventeen samples and seven compounds which exceeded the New Jersey Groundwater Quality Standards (GWQS) for a Class II-A aquifer[1]. One of these samples (MW-8S) showed an apparent increase in VOCs in 2000, and this well was re-sampled during the first quarter 2001 to examine the possibility this could be a sampling anomaly. No VOCs were found, consistent with prior sampling events.

Since 1995, the only exceedances of the Class II-A GWQS have been:

- Trichloroethene in MW-8S in September 1996;
- Methylene chloride in MW-8S, MW-10S, MW-11S, and MW-12S in April 1998;
- MW-8S in December 2000, which was re-sampled in March 2001 when no VOCs were found; and
- Tetrachloro1ethene and trichloroethene in MW-10S in November 2004

Because the groundwater gradient along Peach Island Creek is towards the Creek, surface water samples within the Creek are collected quarterly for VOC analysis. Four surface water points are sampled in each event: SW-01, SW-02, SW-03 and SW-04 as shown on Figure 2. Sample SW-03 is taken adjacent to the Site, SW-04 is upstream from the Site, and samples SW-01 and SW-02 are collected downstream from the Site. Peach Island Creek is a tributary of Berry's Creek, which in turn flows into the Hackensack River and is subject to tidal influences. Because Berry's Creek is a waterway in which there may be a salt water/fresh water interface. Berry's Creek has been classified for surface water quality purposes as FW2-NT/SE. The exact point of demarcation between the fresh and saline waters and associated surface water quality criteria is determined by salinity measurements and is that point where the salinity reaches 3.5 parts per thousand at mean high tide; Peach Island Creek is in the saline portion of the Berry's Creek drainage (Dames & Moore, 1990) and therefore SE water quality standards apply.

The measured VOC concentrations, in µg/L, in the surface water samples from 1992 to 2003 are shown in Appendix A Table 2. For comparison, Table 2 also shows analyses of samples taken before implementation of OU-1. Low levels of VOCs have been detected sporadically in the

[1] Class II-A standards are referred to here for comparison purposes only. Class II-A is effectively the most stringent standard and the hydrogeologic setting of the shallow fill is such that less stringent Class III-B standards would likely apply.

surface waters. In 31% of the samples collected since OU-1 completion (58 of 186 samples) VOCs were either non-detect or were limited to methylene chloride and/or acetone. Methylene chloride and acetone are common laboratory contaminants and have historically been detected in the blanks.

In the remaining 128 samples, low levels of twenty-seven VOCs were detected since installation of the interim remedy. No constituents exceeded the New Jersey Surface Water Quality Standards (SWQS) for SE surface water.

Groundwater and Surface Water SVOCs

Low levels of 21 different SVOCs have been detected in the shallow groundwater since the completion of OU-1 in 1992 (Appendix A, Table 3), the largest proportion of which were detected in MW-9S. Of these detected constituents, only two exceeded the New Jersey Groundwater Quality Standards (GWQS) for a Class II-A aquifer. This occurred in one sampling event: in June, 1992 66 ppb of bis(2-ethylhexyl)Phthalate was detected in MW-11S and Dimethylphthalate was detected in MW-9S (7 ppb) and MW-12S (3 ppb) .

Of the surface water samples analyzed for SVOCs (Appendix A, Table 4), there were 21 detections of seven different compounds, of which only one was detected in more than a single event: bis(2-ethylhexyl)Phthalate. This compound was detected in 18 samples and exceeded the New Jersey Surface Water Quality Standards (SWQS) for SE surface water on two occasions: both in SW-2 in January 1993 and April 1993. There has been very little SVOC impact on the surface waters and as Peach Island Creek is tidal, this compound could have been contributed by other sources.

Groundwater and Surface Water Pesticides/PCBs

Twenty different pesticide or PCB compounds were detected in groundwater (Appendix A, Table 5), none of which exceeded NJ GWQS since 1992. Surface water (Appendix A, Table 6) has been sampled quarterly through 1993 and annually since, and fifteen different compounds have been detected since 1992. Five of these compounds exceeded NJ SWQS for SE surface waters: Chlordane, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and Heptachlor Epoxide. There was one exceedances of 4,4'-DDD in October 1992, nine exceedances of Chlordane, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and Heptachlor Epoxide in 1995, seven exceedances of 4,4'-DDE, 4,4'-DDT, and Heptachlor Epoxide in 1997, and exceedances of Chlordane in SW-04 and Heptachlor Epoxide in SW-03 in 2000. The only detection since 2000 has been 0.36 ppb Arochlor-1254 in SW-02 in 2002.

Groundwater and Surface Water Inorganics

Inorganics have been consistently detected in unfiltered samples taken from the till monitoring wells. There have been 1942 detections of twenty-four metals in shallow groundwater throughout the period of sampling (i.e., since 1992); of which there have been 517 exceedances of twelve metals. The most common exceedances were of iron, sodium, and manganese.

Inorganics have been consistently detected in unfiltered samples collected at each surface water sampling location. There have been 1451 detections of 24 metals in surface water, of which there were 94 exceedances of 6 metals of the NJ SWQS for SE surface waters. These metals were: arsenic, chromium, lead, manganese, mercury, and thallium. The greatest number of exceedances were in samples taken from SW-04 (upstream), followed by SW-01 (most downstream), SW-02, and SW-03 and the most common of these exceedances were for manganese, mercury, and arsenic.

Construction of the slurry wall has clearly ameliorated shallow groundwater conditions outside the Fill Area, and there is no evidence that the slurry wall has been compromised. Data from the on-going OU-1 O&M Plan monitoring program will be used as the basis for the Preliminary Design of the upgraded groundwater extraction system and OU-1 monitoring activities will continue until they are superseded by the O&M Plan for OU-2.

5.0 PRE-DESIGN INVESTIGATION

5.1 Data Gaps

The Focused Feasibility Study Investigation (Golder, 1997) delineated the extent of the sludge Hot Spot, and ongoing O&M monitoring will allow evaluation of the continued effectivness of the slurry wall. Therefore, in accordance with the SOW, the pre-design investigation (PDI) is focused on sampling shallow soils between the slurry wall and the existing sheet pile wall. These objectives of this investigation are to:

- Further examine subsurface geotechnical conditions between the existing slurry wall and installed sheet pile wall for the design of the streambank enhancements;
- Determine sediment elevations within Peach Island Creek in front of the existing sheet pile wall; and,
- Establish geotechnical engineering design parameters for the underlying geologic strata.

In addition, a topographic survey of the Site and adjacent areas will be performed to provide a base map for design purposes. The following sections will present additional details regarding these activities.

Soil investigations will be conducted in accordance with the Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) attached as Appendix B. All fieldwork will be conducted in accordance with the Health and Safety Plan (HASP) provided in the Work Plan Amendment for the Off-Property Investigation (Golder, 1995), that has been updated and is attached as Appendix C. The initial level of protection for all work involving drilling on-Site will be Level D-2. All necessary equipment for possible upgrade to Level C respiratory protection and personal protective equipment (PPE) will be kept on-Site. If Level B respiratory protection and PPE becomes necessary, all work will immediately cease and engineering controls will be implemented until the necessary equipment and personnel can be mobilized on-Site to ensure the work will be completed in a safe manner.

5.2 Subsurface Investigations

The PDI will include the advancement of five geotechnical borings (see Figure 2) between the existing slurry and sheet pile walls, spaced equidistant along the sheet pile wall.

Borings will be drilled from existing ground surface, and will terminate within the underlying glacial till stratum. Hence, these borings would be drilled to about 40 to 50 feet below ground surface. Truck-mounted and/or "skid" rig drilling equipment will be used to advance the required borings to the specified depths and soil samples will be continuously collected using a split barrel samples in accordance with ASTM Standard D1586. In addition, Standard Penetration Test results (SPT N-Values) will be recorded and noted on field borehole logs, and soil samples will be preserved in glass jars for verification of field soil descriptions and sample selection for laboratory testing (i.e., moisture content, Atterberg Limits, particle size analysis).

Undisturbed "Shelby" tube soil samples (3-inch diameter) will be attempted in the underlying soft peat, organic silt and clay deposits at a minimum frequency of one (1) per borehole. It may be difficult to collect undisturbed soil samples of very soft peat and organic silt sediments exhibiting low plasticity. In that event, in-situ vane shear tests may be used, if undisturbed sample recovery is poor, in order to obtain the geotechnical data required for design.

During drilling activities, water level measurements will be collected and recorded where/when observed. In addition, water level measurements will be collected for all existing piezometers within the vicinity of each borehole.

Drill cuttings and fluids will be collected and disposed off-Site in accordance with federal, state and local regulations or placed under the cover during remedial action. Upon completion of the drilling activities, all borings will be sealed in accordance with New Jersey Department of Environmental Protection (NJDEP) requirements. The existing HDPE cover will be repaired in the area of each borehole.

5.3 Sediment Elevations

Sediment elevations will be measured using a staff gauge. A point on the gauge will be surveyed and the distance between the surveyed point and the sediment surface will be measured. The sediment surface will be discerned by lowering a flat plate through the water column until sediment resistance occurs. Three points equally spaced along the sheet pile wall will be measured in this manner.

5.4 Laboratory Testing

The following geotechnical laboratory tests will be performed:

Test	ASTM Method	No. of Tests
Moisture Content	D-2216	25
Atterberg Limits	D-4318	16
Percent Passing #200 Sieve	D-1140	10
Particle Size Analysis (sieve plus hydrometer)	D-422	8
1-D Consolidation (with extra reload/unload cycle)	D-2435	6
Unconsolidated/Undrained Tri-axial Shear	D-2850	6
Consolidated/Undrained Tri-axial Shear	D-4767	3

5.5 Topographic Base Map

An updated topographic base map of the Site will be required for the design of the cap and streambank enhancements. It is anticipated that the topographic map will be field surveyed and prepared at a 1-foot contour interval using the existing coordinate system (New Jersey State Plane, NAD 1983, in feet) and datum (NGVD 1929). A distance of approximately 100 feet beyond the Site will also be surveyed. The topographic base map will include the metes and bounds survey conducted in 2003. Survey crews will be trained for work on hazardous waste sites in accordance with OSHA 1910.120(e) requirements and will follow the Site HASP. The base map will be sealed by a New Jersey licensed surveyor.

6.0 REMEDIAL DESIGN DELIVERABLES

The following design deliverables will be submitted to the USEPA for approval, as described in the SOW:

- A Preliminary (35%) Remedial Design Report;
- A Pre-Final (95%) Remedial Design Report; and,
- A Final Remedial Design (100%) Report.

The anticipated content of each deliverable and the design schedule are discussed in the following sections.

6.1 Preliminary Remedial Design Report (35% Design)

The Preliminary Design Report (PRD) will represent approximately 35% of the overall design effort. The conceptual design of the various elements of the remedy developed in this phase will serve as the basis for the final design, and so the PRD will include appropriate scoping calculations presenting the basis for the design and an accompanying narrative. The emphasis for these calculations will be on development of cost-effective design concepts and demonstrating, with reasonable confidence, their engineering suitability and ability to comply with the performance standards described in Section 7.0.

Preliminary design considerations related to proposed streambank enhancements include:

- Define permit equivalency[2] requirements for various alternatives;
- Evaluate data collected during pre-design investigations, as described herein;
- Establish geotechnical design criteria and construction requirements;
- Perform slope stability and retaining wall design evaluations;
- Assess impacts of streambank enhancements on the existing slurry wall; and
- Establish preferred streambank enhancement to be advanced through final design.

[2] Local, State or Federal permits are not required for work that is being conducted on-Site or in very close proximity to the Site as necessary to implement the remedial work. The substantive technical requirements that would otherwise be included in the permits shall be complied with pursuant to the SOW.

Preliminary design considerations related to the shallow groundwater extraction system include:

- Preliminary design of the number, depth, pumping rates and location of possible additional extraction wells/trenches to maintain long-term inward hydraulic gradients across the slurry wall, where practical;
- Estimation of groundwater effluent concentration and groundwater constituent mass loading for treatment purposes;
- Evaluation of the possibility of discharging the extracted groundwater to the Bergen County POTW for treatment;
- Preliminary design of the location of the conveyance system for the extracted groundwater including proposed locations of utility corridors and sizes (based on extraction well locations and well discharges) and electrical requirements; and,
- General description of geotechnical and physical properties for the clean fill and procedures to verify environmentally clean fill.

Preliminary design considerations for the proposed cover system include:

- Cap grading requirements;
- Evaluation of alternative cap materials, leading to a recommended cap design that complies with the requirements of the SOW;
- Stormwater management;
- Soil erosion, paying particular design attention to protecting the creek bank;
- Cap drainage layer capacity;
- Disposal method(s) for the existing HDPE cover removed during the remedial action; and,
- General description of geotechnical and physical properties for the clean fill and procedures to verify environmentally clean fill.

Preliminary design considerations for treatment and stabilization of the hot spot include:

- Consultation with specialist contractors regarding treatment equipment suitable for the type and location of hot spot;
- Evaluation of admixture quantities and associated volume increase; and
- Initial selection and sizing of treatment technology for off-gases.

The PRD will include a series of drawings showing the general arrangement of all Remedial Action (RA) work planned and a design narrative that will include:

- A discussion and evaluation of the RD activities described in Section 3 above, as addressed by the conceptual design;
- A preliminary discussion of the RA Performance Standards as set out in the SOW, and as will be further developed during the design of the remedy components, including a discussion of the manner in which the RA will achieve the Performance Standards;
- A plan for monitoring air quality and treatment of air during the RA;
- A wetlands delineation. If wetlands will be affected by remedial actions, a wetlands assessment will be made and submitted to the USEPA as part of the 95% Design.
- Floodplain delineation for both 100 and 500 year events. Should the remedial action occur within either floodplain, a floodplain assessment will be submitted as part of the 95% Design.
- A plan for satisfying permit equivalency requirements and an associated schedule;
- A updated draft schedule for remedial action activities;
- A preliminary schedule for operation and maintenance (O&M) and monitoring activities; and,
- Table of Contents for the specifications, including a listing of items from the Construction Specifications Institute master format, which will include a technical specification for photographic documentation of the remedial construction work.

USEPA comments on the PRD will be incorporated in the Pre-Final Design Report. Following receipt of USEPA comments, it is anticipated that a letter will be prepared describing the manner in which the comments in the Pre-Final Design Report will be addressed.

6.2 Pre-Final Remedial Design Report (95% Design)

The pre-Final RD will constitute a complete design submittal. The major elements of the pre-Final design include finalization of the detailed design of the improvements to the sheet pile wall, the shallow groundwater extraction system (including associated utility corridors), the cover system, treatment of the hot spot (including treatment of associated air emissions), and plans for the treatment and disposal of extracted shallow groundwater.

The pre-Final RD report will include the following final documents:

- Engineering plans representing an accurate identification of existing Site conditions and an illustration of the work proposed. Typical items to be provided on such drawings include, at a minimum, the following:

  a. Title sheet including at least the title of the project, a key map, the name of the designer, date prepared, sheet index, and USEPA/NJDEP Project identification;
  b. All property data including owners of record for all properties within 200 feet of the Site;
  c. A Site survey including the distance and bearing of all property lines that identify and define the project Site;
  d. All easements, rights-of-way, and reservations;
  e. All buildings, structures, wells, facilities, and equipment (existing and proposed) if any;
  f. A topographic survey, including existing and proposed contours and spot elevations for all areas that will be affected by the remedial activities, based on U.S. Coast and Geodetic Survey data;
  g. All utilities, existing and proposed;
  h. Location and identification of all significant natural features including, *inter alia*, wooded areas, water courses, wetlands, flood hazard areas, and depressions;
  i. Flood hazard data and 100-year and 500-year flood plain delineation;
  j. North arrow, scale, sheet numbers and the person responsible for preparing each sheet;
  k. Decontamination areas, staging areas, borrow areas and stockpiling areas;
  l. Miscellaneous detail sheets;
  m. Definitions of all symbols and abbreviations; and
  n. A specification for a sign at the site. The sign should describe the project, the name of the contractor performing the RD/RA work or the PRP Group, state that the project is being performed under USEPA oversight, and provide an USEPA contact for further information.

- Survey work that is appropriately marked, recorded and interpreted for mapping, property easements and design completion;

- Drawings of all proposed equipment, improvements, details and all other construction and installation items to be developed in accordance with the current standards and guidelines of the State of New Jersey . Drawings shall be of standard size, approximately 24" x 36". A list of drawing sheet titles will be provided;

- Engineering plans (as necessary) indicating, at a minimum, the following:
  a. Site security measures;
  b. Roadways; and
  c. Electrical, mechanical, structural, as required.

- Any value engineering proposals;

- Construction Specifications in Construction Specifications Institute master format;

- A Construction Quality Assurance Project Plan (CQAPP), which shall detail the approach to quality assurance during construction activities at the Site, shall specify a quality assurance official (QA Official), independent of the Remedial Action Contractor, to conduct a quality assurance program during the construction phase of the project. The CQAPP shall address sampling, analysis, and monitoring to be performed during the remedial construction phase of the Work. Quality assurance items to be addressed include, at a minimum, the following:

  a. Inspection and certification of the Work;
  b. Measurement and daily logging;
  c. Field performance and testing;
  d. A technical specification for photographic documentation of the remedial construction work;
  e. As-built drawings and logs; and
  f. Testing of the RA Work to establish whether the design specifications have been attained.

- A report describing those efforts made to secure access and institutional controls and obtain other approvals and the results of those efforts. Legal descriptions of property or easements to be acquired shall be provided;

- A plan for implementation of construction and construction oversight;

- A method for selection of the construction contractor(s);

- A refined proposed schedule for implementing all of the above;

- A discussion and evaluation of how the above designs address the Remedial Activities as set forth in the Consent Decree;

- A discussion of how the design will meet the specified Performance Standards; and

- A proposed schedule for O&M and monitoring activities.

6.3 Final Remedial Design Report (100% Design)

The Final Remedial Design Report shall include all of the above, including agreed-to changes requested by the USEPA on reviewing the Pre-Final RD report. The Final Report will include the revised design drawings, specifications and schedule for Remedial Action.

7.0 PERFORMANCE STANDARDS AND PERMIT EQUIVALENCY REQUIREMENTS

7.1 ARARs

The Remedial Design will be undertaken to achieve compliance with the Performance Standards, which shall include the specific technical requirements set forth in the ROD. The Remedial Design must also achieve compliance with applicable and relevant and appropriate requirements (ARARs) specified in the ROD, including substantive requirements promulgated under the Resource Conservation and Recovery Act (RCRA), the New Jersey Technical Requirements for Site Remediation, N.J.A.C. 7-26E et seq., the New Jersey Brownfield and Contaminated Site Remediation Act, N.J.A.C. 58:10B and applicable local requirements including New Jersey Meadowlands Commission (formerly known as the Hackensack Meadowlands Development Commission) regulations. ARARs may relate to the substances addressed by the remedial action (chemical-specific), to the location of the Site (location-specific), or the manner in which the remedial action is implemented (action-specific).

Action-Specific ARARs and TBCs may include, but are not limited to:

- National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61);
- NJ Administrative Code (NJAC) 7:26E *et seq,* New Jersey Technical Requirements for Site Remediation. Note: The substantive requirements of the Technical Requirements may qualify as ARARs where they are more stringent than federal requirements and where they do not conflict with CERCLA or the ROD requirements. This distinction is relevant, for example, where the Technical Requirements require deliverables inconsistent with the NCP or where they require permits that conflict with provisions of CERCLA or the NCP;
- National Ambient Air Quality Standards (40 CFR Part 50);
- RCRA - Land Disposal Restrictions for off-Site disposal (40 CFR Part 268);
- RCRA - Generator Requirements for Manifesting Waste for off-Site Disposal (40 CFR Part 263);
- RCRA - Transporter Requirements for off-Site Disposal (40 CFR Part 270);
- DOT - Rules for Hazardous Materials Transport for off-Site disposal (49 CFR Parts 107, 171, 173)
- E.O. 11988 – "Floodplain Management";

- E.O. 11990 – "Protection of Wetlands";
- USEPA – "Statement of Policy on Floodplains/Wetlands Assessments for CERCLA Actions"; and,
- The Coastal Zone Management Act.

7.2 Performance Standards

7.2.1 Hot Spot Treatment

Air stripping and addition of cement and lime (and to the extent necessary and if approved by USEPA, other treatment) of the hot spot will be performed so as to reduce the arithmetic mean total concentration of VOCs to whichever is more stringent of: 10% of the arithmetic mean of untreated samples taken from the hot spot during the Treatability Study ("current level"); the arithmetic mean total concentration of VOCs within the area of concern outside the Hot Spot (i.e., 1,000 ppm based on RI data); or a level which will not interfere with stabilization. The treatment shall also solidify and stabilize the Hot Spot to achieve both an arithmetic mean unconfined compressive strength of at least 15 psi and at least a 90% reduction in the arithmetic mean Synthetic Precipitation Leaching Procedure (SPLP) leachability of PCBs when compared to untreated samples analyzed in the Treatability Study. In addition, the treatment must achieve a 90% reduction in the arithmetic mean SPLP leachability for the constituents listed in Table 1 when compared to untreated samples analyzed in the Treatability Study, or the SPLP leached extract must comply with the respective Maximum Concentrations specified in Table 1. VOCs released during treatment will be collected and treated on-Site to assure no negative impacts to the surrounding community. Air monitoring will be performed during construction/remedial activities at the Site to ensure that air emissions meet applicable or relevant and appropriate air emission requirements.

7.2.2 Streambank Enhancement

Design of the proposed streambank enhancement remedies will follow generally accepted procedures, as typically described in the Naval Facilities Design Manuals DM-7.01 and 7.02. Overall, all proposed wall/slope systems will be designed utilizing static equilibrium methods, and will incorporate factors-of-safety, which are consistent and appropriate to the selected remedial designs. Design calculations will address the stability and integrity of all vertical barriers consistent with groundwater conditions anticipated to exist after installation of the new extraction wells. The

Preliminary Design report will describe all design criteria, assumptions and methodologies used in design.

7.2.3 Cover Design

The cover system will be designed, constructed and maintained to meet the substantive requirements of RCRA Subtitle C (40 CFR 264.310). Two preliminary cover sections have been identified meeting these requirements, a vegetated surface option and an asphalt surface option. Conceptual cross-sections for each system are illustrated in Figure 5. Alternate methods and materials, which provide equal or superior performance, may be considered during design. The basic components of each of the cover sections include a prepared subgrade, a double barrier system, and a drainage layer.

7.2.4 Groundwater Recovery, Treatment, and Disposal

Plans and specifications will be developed for installation of new extraction wells along the perimeter of the Site within the Fill Area that will be screened within the fill material, so that groundwater may be extracted as necessary to achieve long term inward hydraulic gradient within the Fill Area, where practical. The extracted groundwater will either be collected in the existing above-ground tank for off-Site disposal, and/or transferred, via sewer connection, to the Bergen County Publicly Owned Treatment Works (POTW) for treatment.

7.3 Permitting Requirements

The need for regulatory permits or permit equivalencies will ultimately depend on the final design of the remedy for the Site. Furthermore, the majority of regulatory permit needs appear to be focused on the stream bank enhancement remedial alternative, and at this time, it is not certain whether said enhancement will fall on the land or water side of the existing sheet pile wall. Therefore, the following sections consider the regulatory permit requirements for streambank enhancements landward/waterward of the existing sheet pile wall and potentially applicable discharge permits for extracted groundwater.

7.3.1 Construction Landward of Existing Sheet Pile Wall

If construction activities are restricted to landward of the existing sheet pile wall, it appears that only a limited number of approvals should be required, including: a) a request to NJDEP for a **Jurisdictional Determination** to determine the need for a **Stream Encroachment Permit** under

the Flood Hazard Area Control Act Rules (N.J.A.C. 7:13); and b) **Soil Erosion and Sediment Control Plan Certification** by the Soil Conservation Service will be required since the overall remedial activity exceeds 5,000 sf of soil disturbance.

7.3.2 Construction Waterward of Existing Sheet Pile Wall

If activities are proposed for waterward of the existing sheet pile wall several approvals may be required. There are no wetlands on-site that are regulated by the USACOE and/or NJDEP. The only areas regulated by the USACOE are the tidal waters of Peach Island Creek. Furthermore, it is Golder's understanding that the NJDEP will not regulate wetlands, wetland transition areas or open waters under the Freshwater Wetlands Protection Act rules (N.J.A.C. 7:7A), given that the project is located within the area regulated by New Jersey Meadowlands Commission (NJMC).

A request for **Jurisdictional Determination** will be submitted to the NJDEP to determine the requirement for a **Stream Encroachment Permit** under the Flood Hazard Area Control Act Rules (N.J.A.C. 7:13).

If the streambank enhancement is to be placed in the same location or slightly waterward of the existing sheet pile wall, the activity would likely be authorized under a **USACOE Nationwide Permit (NWP) #3** for replacement of existing serviceable structures or under **NWP #38** for remediation of hazardous waste sites. In addition, a **NJDEP 401 Water Quality Certification and Coastal Zone Consistency Determination** would be required to authorize either NWP.

Furthermore, any development within the site that is located waterward of the existing sheet pile wall would be regulated under the Coastal Program Permit rules (N.J.A.C. 7:7), and would require a **Waterfront Development Permit** from NJDEP. Activities located landward of the existing sheet pile wall bulkhead are not regulated under this policy. Water quality certification would be automatically issued with a Waterfront Development Permit granted by the NJDEP. Mitigation may be required for any impacts to "intertidal and subtidal shallows", and two wetland mitigation banks are located within the NJMC that can be utilized to provide mitigation. If mitigation is required, a Wetlands Mitigation Plan will be submitted.

If not already issued for the site, a **Tidelands Instrument** and accompanying Waterfront Development Permit would be required for work at the site above the mean high water of Peach Island Creek if portions of the site were formerly flowed by the tide. These are lands that are

owned by the State of New Jersey and a licensing agreement in the form of a lease, grant, conveyance or management agreement must be obtained, if they are developed by private interests. The Tidelands Claim map for the site is # 721-2160. The "tidelands instrument" should have been recorded in the office of the clerk of Bergen County if it has been obtained.

Since the overall remedial project exceeds 5,000 square-feet of soil disturbance, a **Soil Erosion and Sediment Control plan certification** will be required from the Bergen County Soil Conservation District in accordance with "Standards for Soil Erosion and Sediment Control" and under the Soil Erosion and Sediment Control Act N.J.S.A. 4:24-39 *et seq.* and implementing rules.

7.3.3 Groundwater Discharge Permit

A permit will be required to discharge groundwater from the extraction system to the sanitary sewer and ultimately to the Bergen County Utilities Authority (BCUA) Treatment Works, or to discharge via tanker truck to BCUA. Submittal requirements set forth in the Rules and Regulations for the Direct and Indirect Discharge of Wastewater to the Bergen Utilities Authority Treatment Works include:

- Description of proposed pre-treatment system, if any, including list of all equipment to be used, schematics of the proposed treatment system, and descriptions of target pollutants to be treated through each unit process;
- Site plan with location of structures, test wells, treatment system, proposed connection into sanitary sewer, sampling points, etc.;
- Explanation as to why proposed discharge of groundwater into the sanitary sewer represents the best or only disposal method available compared to surface water, storm sewer, subsurface reinjection well, or off-site disposal. This is to justify waiving the BCUA's prohibition against the discharge of groundwater into the BCUA Treatment Works;
- Report of analytical results of expected pollutants and a list of analytical methods used;
- Description of sampling preservation and chain of custody procedures;
- Description of expected duration of discharge, volume of wastewater, and rate of discharge; and
- Indicate known or expected concentrations or quantity of a list of pollutants potentially in wastewater discharge.

8.0 REMEDIAL DESIGN/REMEDIAL ACTION SCHEDULE

A draft bar chart schedule for implementation of the Remedial Design and Remedial Action required by the Consent Decree is shown in Figure 8. The schedule shown begins with the initial submittal of this RDWP and includes a preliminary schedule for the Remedial Action. The actual schedule will be dependent upon several other factors:

- USEPA's review and approval time for project deliverables;
- Acquisition of required permit equivalences; and,
- Contractor procurement, means and methods, and weather.

The schedule will be refined throughout the Remedial Design and the remedial action and monitoring aspects may be revised, subject to USEPA's approval.

9.0 PROJECT ORGANIZATION

The project management and organization for the Remedial Design is illustrated below. The key personnel selected for the project have broad experience on a variety of CERCLA projects, including multiple remedial designs and management of remedial construction.

Key team members include the following:

Project Coordinator

The Project Coordinator is Mr. P. Stephen Finn, a Principal of Golder Associates. He will be the primary point of communication for the Group and will serve as the liaison between the Agencies (USEPA and NJDEP) and the Remedial Design team. USEPA approved Mr. Finn as the Project Coordinator, by letter dated August 12, 2004.

Golder Project Director

The Project Director for the Remedial Design will be Mr. Robert Illes, an Associate of Golder Associates. Mr. Illes will be responsible for the overall schedule control and technical evaluation of the Remedial Design. He will review all major technical evaluations and reports and will also be responsible for ensuring the appropriate resources are made available to ensure project execution in a timely manner.

Quality Review Team

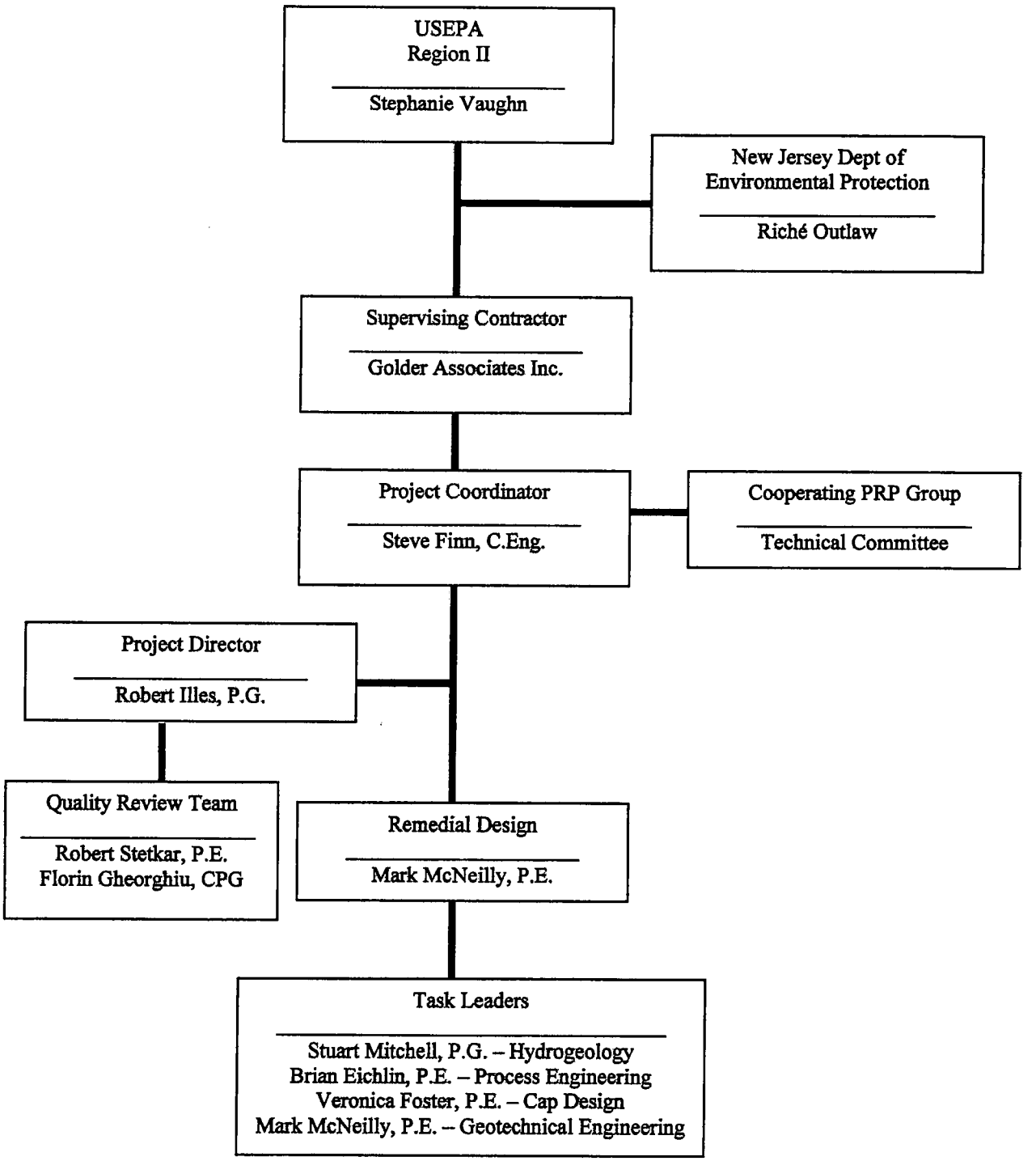
The Quality Review Team will consist of Mssrs. Stetkar and Gheorghiu, Principals of Golder. The Quality Review Team will report directly to the Project Director and will serve as independent reviewers of the design and will not be directly involved in the design. Mr. Gheorghiu will review the design of the extraction system and Mr. Stetkar will review the remaining elements of the design.

Design Manager

The Project Manager for the Remedial Design will be Mr. Mark McNeilly, P.E., an Associate of Golder Associates. Mr. McNeilly will be responsible for the day to day coordination of all design activities. He will be responsible for implementing the project plans, as well as scheduling, and integration of the various technical disciplines which will be required during this project.

Task Leaders

The Task Leaders will be responsible for management of the design elements associated with their key technical disciplines.



10.0 REFERENCES

Canonie Environmental, 1992. "Final Report Interim Remedy for First Operable Unit Scientific Chemical Processing Superfund Site at 216 Paterson Plank Road, Carlstadt, New Jersey," September 1992.

Canonie Environmental, 1991. "Interim Remedy Remedial Design Report," July 19, 1991.

Dames & Moore, 1990. "Final Report - Remedial Investigation SCP Site, Carlstadt, New Jersey," March 1, 1990.

Dames & Moore, 1989. "Test Pit Investigation SCP/Carlstadt July 1989," August 4, 1989.

Dames & Moore, 1988. "Revision No. 9, Project Operations Plan, SCP Site Remedial Investigation, Carlstadt, New Jersey," September 30, 1988.

Dames & Moore, 1988. "Revision No. 8 (Amended) Project Operations Plan, SCP Site Remedial Investigation, Carlstadt, New Jersey," September 30, 1988.

Environmental Resources Management, Inc., 1989. "Preliminary Feasibility Study for the First Operable Unit of the SCP/Carlstadt Site," July 1989.

Golder Associates Inc., 2001. Focused Feasibility Study Operable Unit 2 Final Remedy: Fill and Shallow Groundwater, April 2001.

Golder Associates Inc., 1998. Treatability Testing Work Plan, August 1998.

Golder Associates Inc., 1997. Off-Property Investigation, Interim Data Report, January 1997.

Golder Associates Inc., 1997. Focused Feasibility Investigation Report, November 1997.

Golder Associates Inc., 1995. "Final Work Plan Amendment: Focused Feasibility Study: First Operable Unit Soils and Additional Off-Property Investigation," December 1995.

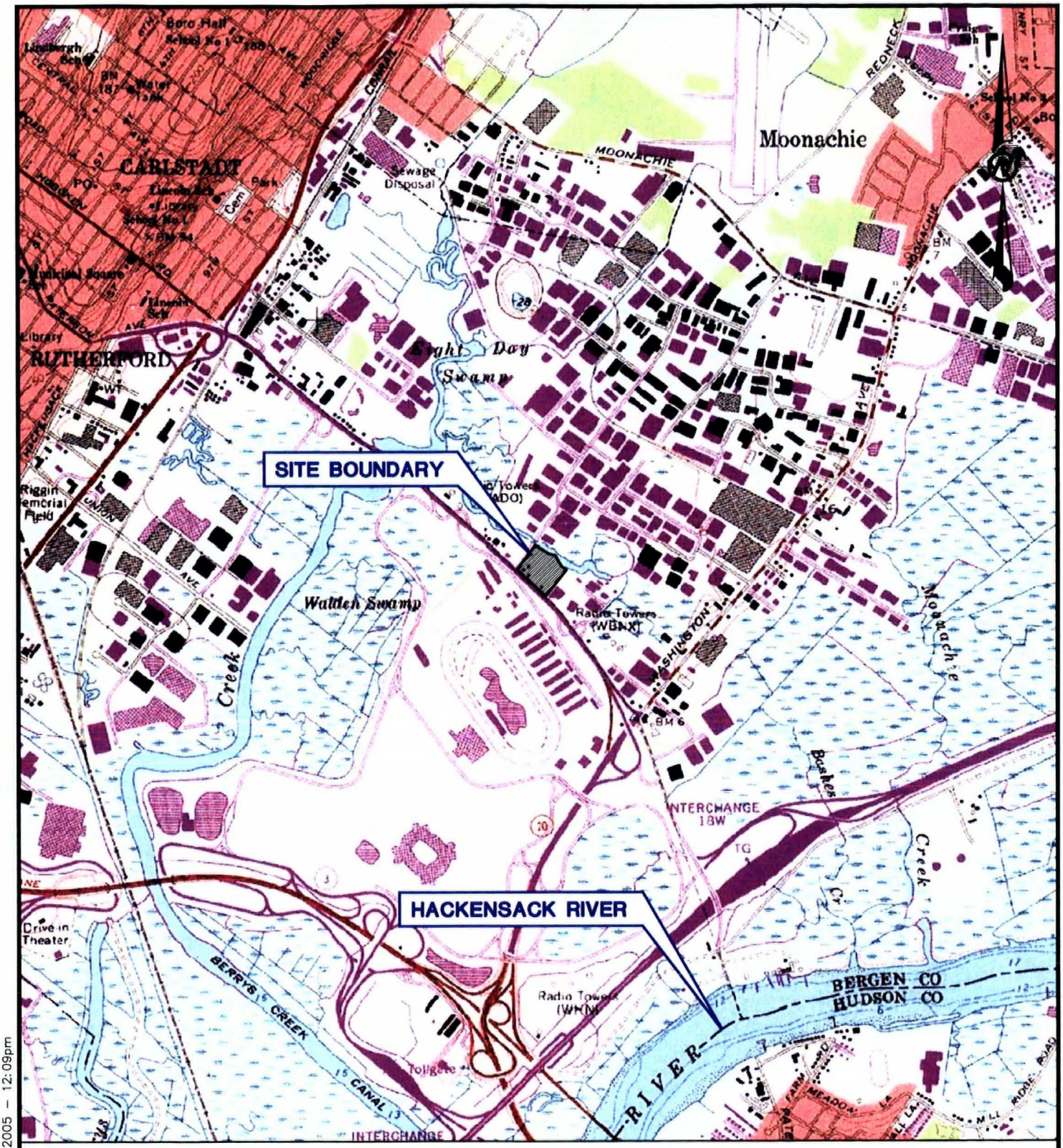
United States Environmental Protection Agency, 1990. "Administrative Order Index No. II CERCLA-00116," September 28, 1990.

United States Environmental Protection Agency, 1985. "Administrative Order Index No. II CERCLA-60102," October 23, 1985

United States Environmental Protection Agency, 1985. "Administrative Order on Consent Index No. II CERCLA-50114," September 30, 1985.

TABLE 1
ALTERNATE PERFORMANCE STANDARDS FOR SPLP EXTRACT
216 PATERSON PLANK ROAD
CARLSTADT, NEW JERSEY

CONTAMINANT	CAS #	REGULATORY LEVEL (mg/l)
Arsenic	7440-38-2	5.0
Barium	7440-39-3	100.0
Benzene	71-43-2	0.5
Cadmium	7440-43-9	1.0
Chlorobenzene	108-90-7	100.0
Chloroform	67-66-3	6.0
Chromium	7440-47-3	5.0
1,2 Dichloroethane	107-06-2	0.5
1,1 Dichloroethylene	75-35-4	0.7
Hexachlorobutadiene	87-68-3	0.5
Lead	7439-92-1	5.0
Mercury	7439-97-6	0.2
Selenium	7782-49-2	1.0
Silver	7740-22-4	5.0
Tetrachloroethylene	127-18-4	0.7
Trichloroethylene	79-01-6	0.5



REFERENCE

1.) BASE MAP TAKEN FROM U.S.G.S. 7.5 MINUTE QUADRANGLE OF WEEHAWKEN, NEW JERSEY, DATED 1967 AND PHOTOREVISED 1981.

2000 0 2000
APPROXIMATE SCALE FEET

Golder Associates
Philadelphia USA

FILE No.	9436222E001
PROJECT No.	943-6222
REV.	0

SCALE	AS SHOWN
DATE	11/09/04
DESIGN	SDM
CADD	RG
CHECK	RJI
REVIEW	PSF

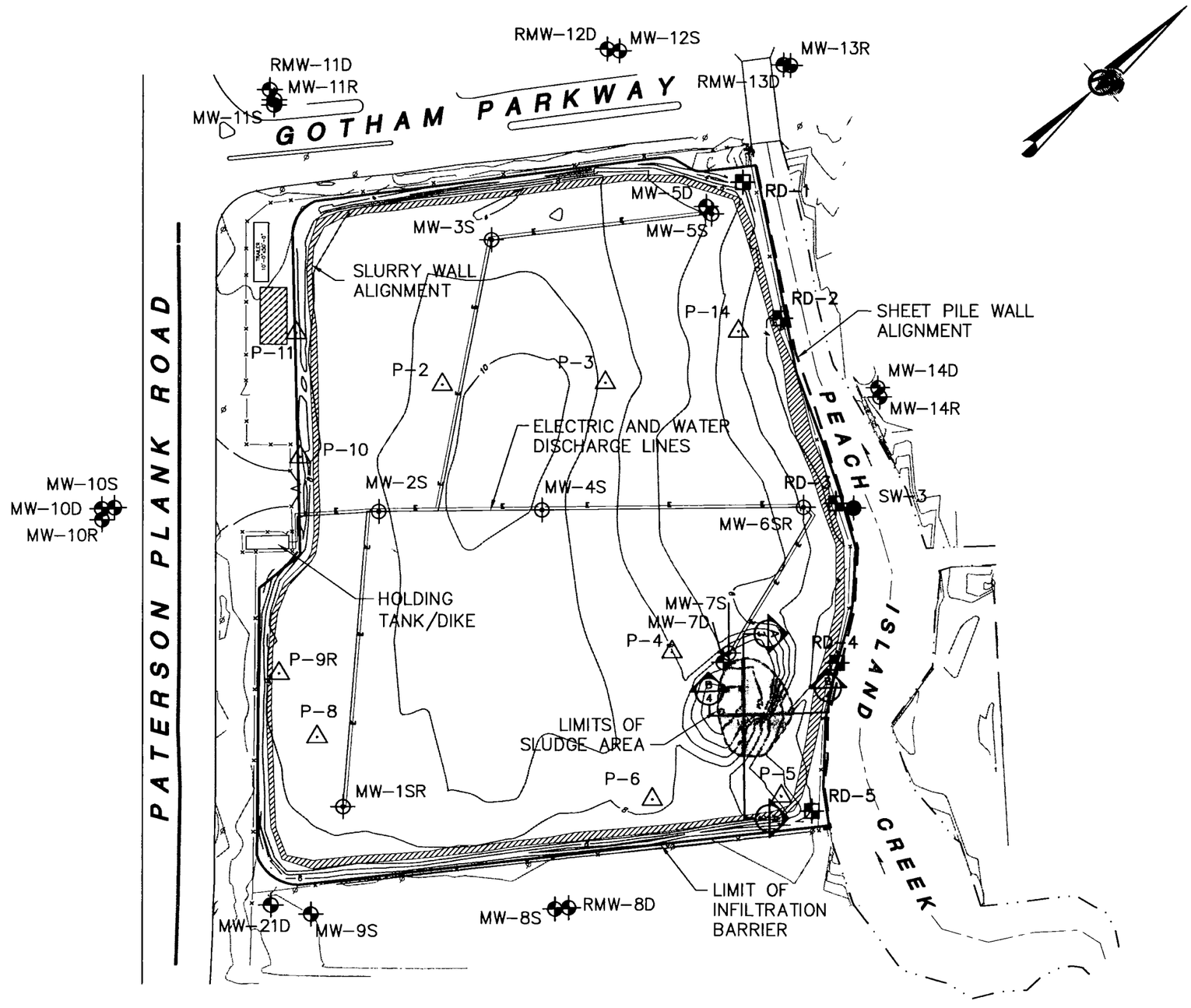
TITLE

SITE LOCATION MAP

216 PATERSON PLANK ROAD SITE

FIGURE 1

Drawing file: 9436222E001.dwg Apr 01, 2005 - 12:09pm



LEGEND

- DETAIL OR CROSS SECTION DESIGNATION / FIGURE No. WHERE DETAIL OR CROSS SECTION IS PRESENTED
- EXISTING GROUND CONTOUR
- STREAM
- FENCE
- UTILITY POLE
- SW-3 — EXISTING SURFACE WATER SAMPLING LOCATION (SEE NOTE 3)
- MW-4S — EXISTING GROUNDWATER EXTRACTION WELLS
- MW-13R — EXISTING GROUNDWATER MONITORING WELL
- P-3 — EXISTING PIEZOMETER
- RD-1 — PROPOSED PRE-DESIGN INVESTIGATION BORINGS
- SLURRY WALL ALIGNMENT
- SHEET PILE WALL ALIGNMENT
- LIMIT OF INFILTRATION BARRIER

NOTES

1.) TOPOGRAPHIC DATA AND SURFACE FEATURES BASED ON INFORMATION BY TAYLOR, WISEMAN & TAYLOR CONSULTING ENGINEERS/SURVEYORS/PLANNERS/ LANDSCAPE ARCHITECTS, MOUNT LAUREL, NEW JERSEY, DATED 06/12/92, SCALE 1"=40'.

2.) APPROXIMATE LIMITS OF SLUDGE AREA ARE TAKEN FROM THE FOCUSED FEASIBILITY STUDY INVESTIGATION REPORT (GOLDER, 1997).

3.) SURFACE WATER SAMPLING POINT SW-1 IS LOCATED AT THE CONFLUENCE OF PEACH ISLAND AND BERRY'S CREEKS, APPROXIMATELY ONE THIRD OF A MILE NORTHWEST OF THE SITE. SURFACE WATER SAMPLING POINT SW-2 IS LOCATED ON PEACH ISLAND CREEK, 150 FEET NORTHWEST OF THE SITE AS MEASURED FROM THE NORTH CORNER OF THE PROPERTY BOUNDARY. SURFACE WATER SAMPLING POINT SW-4 IS LOCATED ON PEACH ISLAND CREEK, 150' EAST OF THE SITE, AS MEASURED FROM THE EAST CORNER OF THE PROPERTY BOUNDARY.

100 0 100
SCALE FEET

"MEADOWLANDS SPORTS COMPLEX"

Drawing file: 9436222E002.dwg Apr 01, 2005 - 12:23pm

NJ Authorization #24GA28029100
Golder Associates
Philadelphia USA

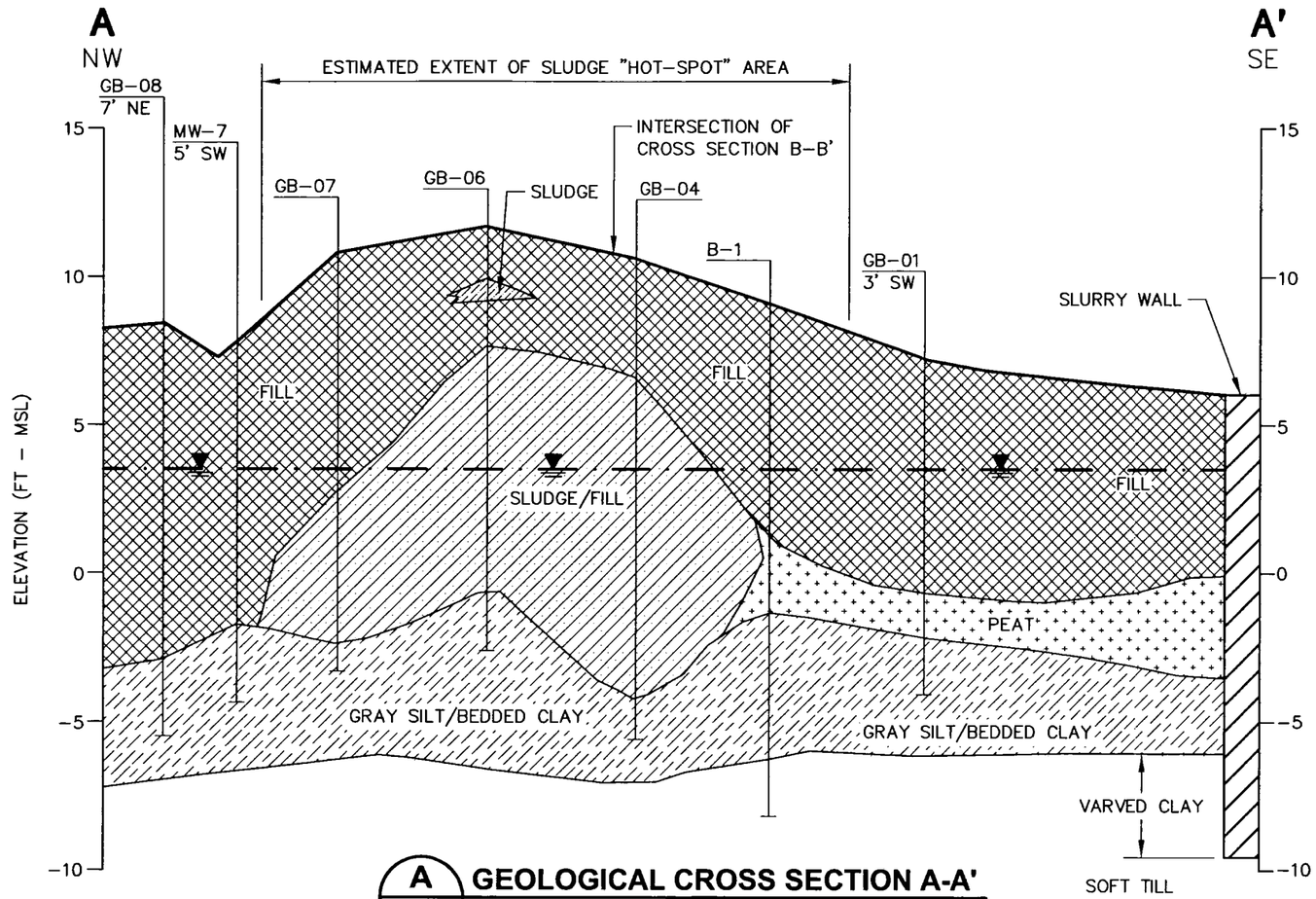
SCALE	AS SHOWN
DATE	11/09/04
DESIGN	SDM
CADD	RG
CHECK	RJI
REVIEW	PSF
FILE No.	9436222E002
PROJECT No.	943-6222
REV.	0

TITLE

SITE CONDITIONS

216 PATERSON PLANK ROAD SITE

FIGURE 2



A/3 GEOLOGICAL CROSS SECTION A-A'

LEGEND

- A/3 — DETAIL OR CROSS SECTION DESIGNATION; FIGURE No. WHERE DETAIL OR CROSS SECTION IS PRESENTED
- GB-01 / 4 ft. NW — BOREHOLE LABEL; PROJECTED DISTANCE
- BOTTOM OF BOREHOLE
- FILL
- SLUDGE/FILL
- SLUDGE
- PEAT
- GRAY SILT / BEDDED CLAY (UPPER HORIZON GLACIOLACUSTRINE VARVED CLAY)
- APPROXIMATE GROUNDWATER SURFACE BASED ON AVERAGE WATER LEVEL DATA OBTAINED FROM NEARBY PIEZOMETERS IN JULY 1997

NOTES

1.) CROSS SECTION TAKEN FROM FEASIBILITY STUDY INVESTIGATION REPORT (GOLDER, 1997).

2.) COORDINATE SYSTEM SHOWN IS NEW JERSEY STATE PLANE NAD27 AND VERTICAL DATUM BASED ON NAVD 1929.

2.) LOCATION OF SLURRY WALL INVESTIGATION BORINGS AND TEST PIT LOCATIONS ARE APPROXIMATE. BORING & TEST PIT LOCATIONS WERE PREVIOUSLY SURVEYED USING A SITE SPECIFIC COORDINATE SYSTEM.

20 0 20
HORIZONTAL SCALE FEET

5 0 5
VERTICAL SCALE FEET

REFERENCES

1.) TOPOGRAPHIC DATA AND SURFACE FEATURES BASED ON INFORMATION BY TAYLOR, WISEMAN & TAYLOR CONSULTING ENGINEERS/SURVEYORS/PLANNERS/LANDSCAPE ARCHITECTS, MOUNT LAUREL, NEW JERSEY, DATED 06/12/92, SCALE 1"=40'.

2.) MONITORING WELLS, PIEZOMETERS, AND EXTRACTION WELLS SURVEYED BY GEOD CORPORATION, NEWFOUNDLAND, NJ IN OCTOBER 1996 AND SOIL BORINGS IN AUGUST 1997.

3.) SLURRY WALL BORINGS AND FEATURES FROM THE INTERIM REMEDIAL MEASURES TAKEN FROM CANONIE ENVIRONMENTAL, 1992 "INTERIM REMEDY FOR FIRST OPERABLE UNIT", AUGUST 1992.

4.) DAMES & MOORE, 1990. "FINAL REPORT – REMEDIAL INVESTIGATION SCP SITE, CARLSTADT, NEW JERSEY", MARCH 1, 1990.

5.) DAMES & MOORE, 1989. – "TEST PIT INVESTIGATION SCP / CARLSTADT JULY 1989 CARLSTADT, NEW JERSEY", AUGUST 4, 1989.

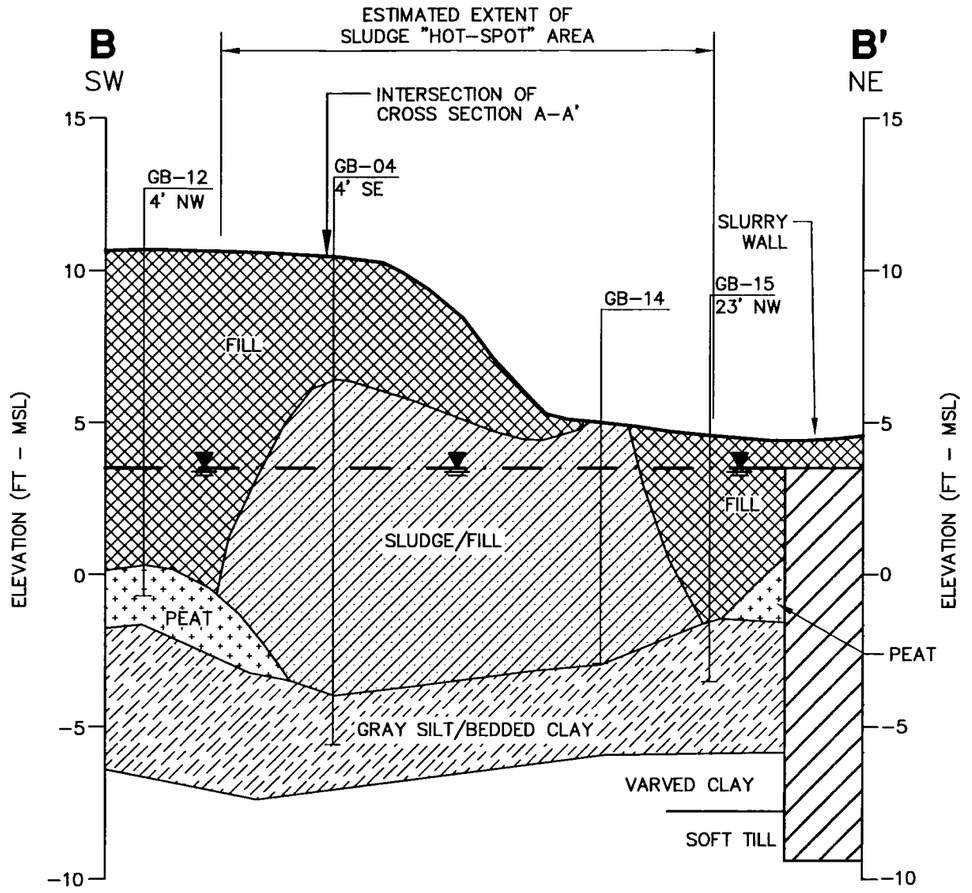
Golder Associates
Philadelphia USA

FILE No.	9436222E005
PROJECT No.	943-6222 REV. 0
SCALE	AS SHOWN
DATE	11/09/04
DESIGN	RJI
CADD	RG
CHECK	RJI
REVIEW	PSF

TITLE: **CROSS SECTION A-A'**

216 PATERSON PLANK ROAD SITE | FIGURE 3

Drawing file: 9436222E005.DWG Apr 01, 2005 - 12:22pm



B/4 **GEOLOGICAL CROSS SECTION B-B'**

LEGEND

- B/4 — DETAIL OR CROSS SECTION DESIGNATION; FIGURE No. WHERE DETAIL OR CROSS SECTION IS PRESENTED
- GB-01 / 4 ft. NW — BOREHOLE LABEL; PROJECTED DISTANCE
- BOTTOM OF BOREHOLE
- FILL
- SLUDGE/FILL
- SLUDGE
- PEAT
- GRAY SILT / BEDDED CLAY (UPPER HORIZON GLACIOLACUSTRINE VARVED CLAY)
- APPROXIMATE GROUNDWATER SURFACE BASED ON AVERAGE WATER LEVEL DATA OBTAINED FROM NEARBY PIEZOMETERS IN JULY 1997

NOTES

1.) CROSS SECTION TAKEN FROM FEASIBILITY STUDY INVESTIGATION REPORT (GOLDER, 1997).

2.) COORDINATE SYSTEM SHOWN IS NEW JERSEY STATE PLANE NAD27 AND VERTICAL DATUM BASED ON NAVD 1929.

2.) LOCATION OF SLURRY WALL INVESTIGATION BORINGS AND TEST PIT LOCATIONS ARE APPROXIMATE. BORING & TEST PIT LOCATIONS WERE PREVIOUSLY SURVEYED USING A SITE SPECIFIC COORDINATE SYSTEM.

20 0 20
HORIZONTAL SCALE FEET

5 0 5
VERTICAL SCALE FEET

REFERENCES

1.) TOPOGRAPHIC DATA AND SURFACE FEATURES BASED ON INFORMATION BY TAYLOR, WISEMAN & TAYLOR CONSULTING ENGINEERS/SURVEYORS/PLANNERS/LANDSCAPE ARCHITECTS, MOUNT LAUREL, NEW JERSEY, DATED 06/12/92, SCALE 1"=40'.

2.) MONITORING WELLS, PIEZOMETERS, AND EXTRACTION WELLS SURVEYED BY GEOD CORPORATION, NEWFOUNDLAND, NJ IN OCTOBER 1996 AND SOIL BORINGS IN AUGUST 1997.

3.) SLURRY WALL BORINGS AND FEATURES FROM THE INTERIM REMEDIAL MEASURES TAKEN FROM CANONIE ENVIRONMENTAL, 1992 "INTERIM REMEDY FOR FIRST OPERABLE UNIT", AUGUST 1992.

4.) DAMES & MOORE, 1990. "FINAL REPORT – REMEDIAL INVESTIGATION SCP SITE, CARLSTADT, NEW JERSEY", MARCH 1, 1990.

5.) DAMES & MOORE, 1989. – "TEST PIT INVESTIGATION SCP / CARLSTADT JULY 1989 CARLSTADT, NEW JERSEY", AUGUST 4, 1989.

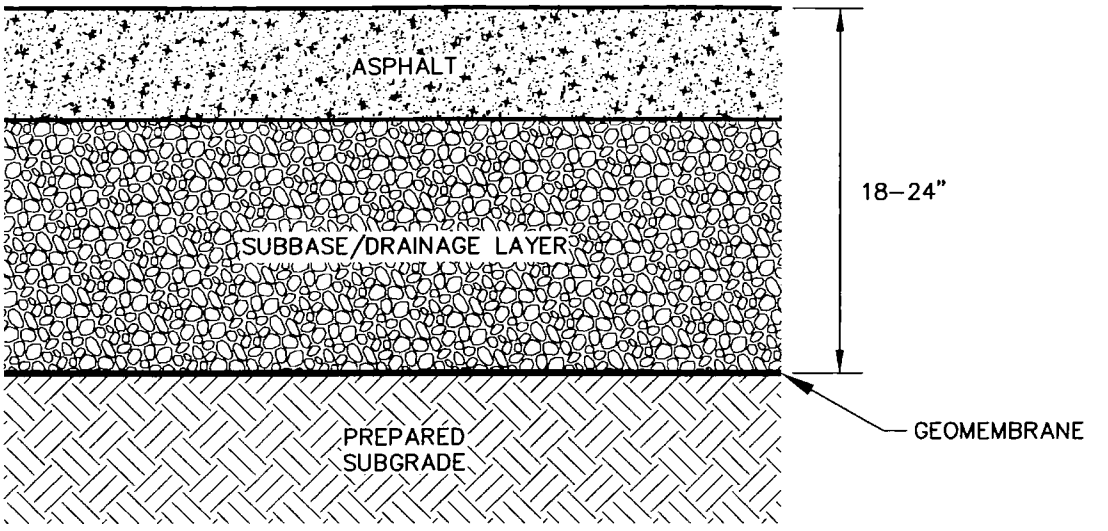
Golder Associates Philadelphia USA

FILE No.	9436222E006	SCALE	AS SHOWN
PROJECT No.	943-6222 REV. 0	DATE	11/09/04
		DESIGN	RJI
		CADD	AM
		CHECK	RJI
		REVIEW	PSF

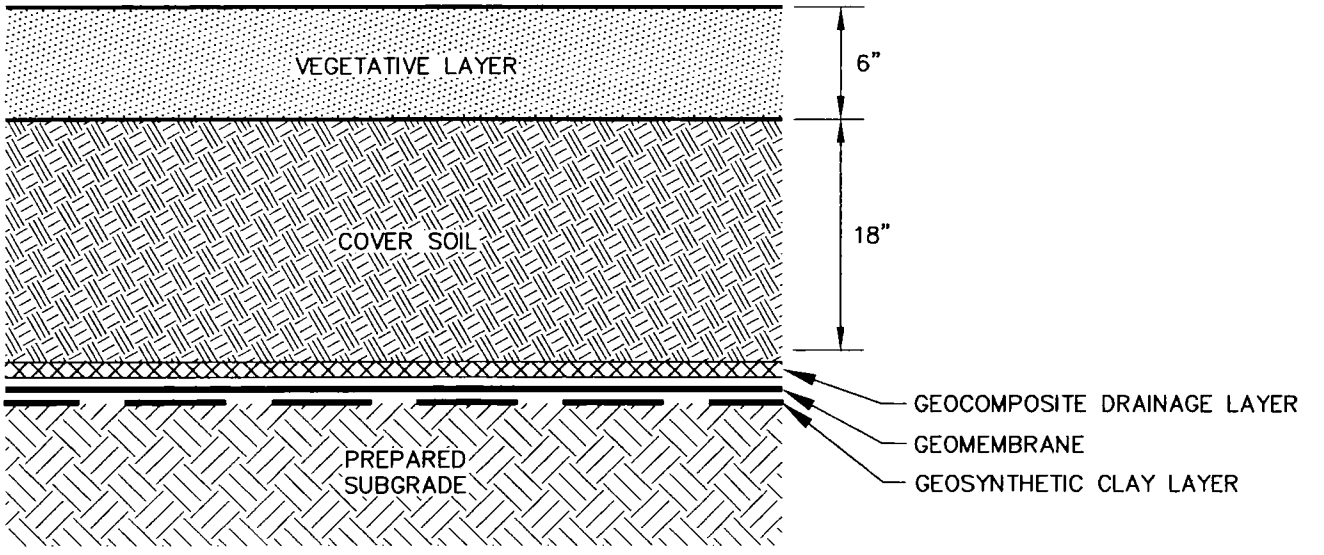
TITLE: **CROSS SECTION B-B'**

216 PATERSON PLANK ROAD SITE | FIGURE 4

Drawing file: 9436222E006.DWG Apr 01, 2005 - 12:22pm



ASPHALT SURFACE OPTION



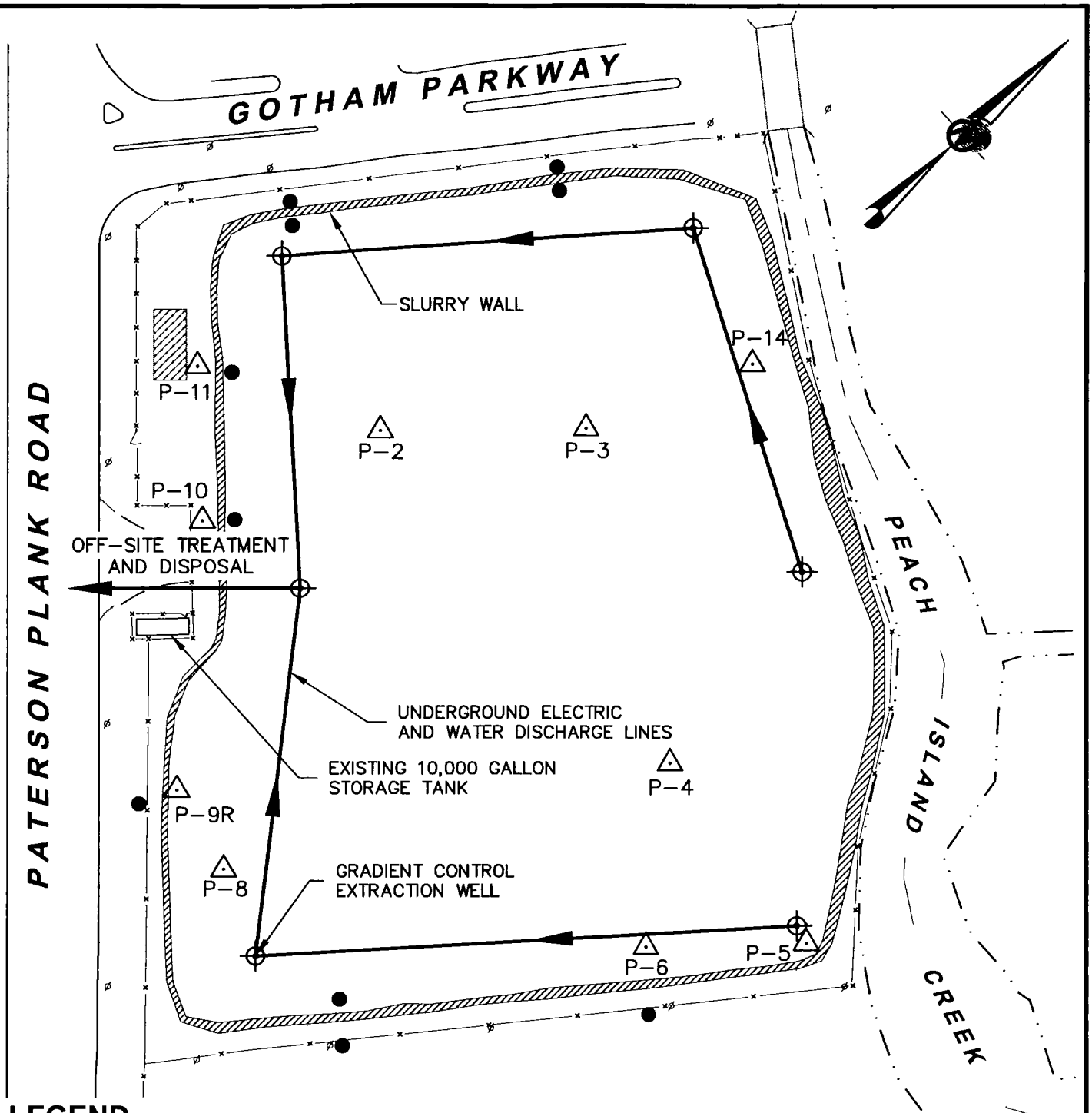
VEGETATED SURFACE OPTION

NOTE

1.) OPTIONS PROVIDE EQUIVALENT PERFORMANCE, AND ACTUAL COVER WILL LIKELY BE A COMBINATION OF OPTIONS TO SUIT SITE RE-USE REQUIREMENTS.

NJ Authorization #24GA28029100	SCALE AS SHOWN	TITLE	
Golder Associates Philadelphia USA	DATE 11/09/04	CAP OPTIONS	
	DESIGN SDM		
	CADD RG		
FILE No. 9436222E003	CHECK RJI		
PROJECT No. 943-6222 REV. 0	REVIEW PSF	216 PATERSON PLANK ROAD SITE	FIGURE 5

Drawing file: 9436222E003.DWG Apr 01, 2005 - 12:23pm



LEGEND

- PROPOSED EXTRACTION WELL
- PROPOSED PIEZOMETER
- EXISTING PIEZOMETER

NOTE

1.) OFF-SITE TREATMENT AND DISPOSAL PREFERABLY AT POTW (OTHERWISE AT PERMITTED COMMERCIAL FACILITY). EXISTING 10,000 GALLON STORAGE TANK MAY BE USED AS NECESSARY.

100 0 100
SCALE FEET

NJ Authorization #24GA28029100
Golder Associates
Philadelphia USA

FILE No.	9436222E004
PROJECT No.	943-6222 REV. 0
SCALE	AS SHOWN
DATE	11/09/04
DESIGN	SDM
CADD	RG
CHECK	RJI
REVIEW	PSF

TITLE

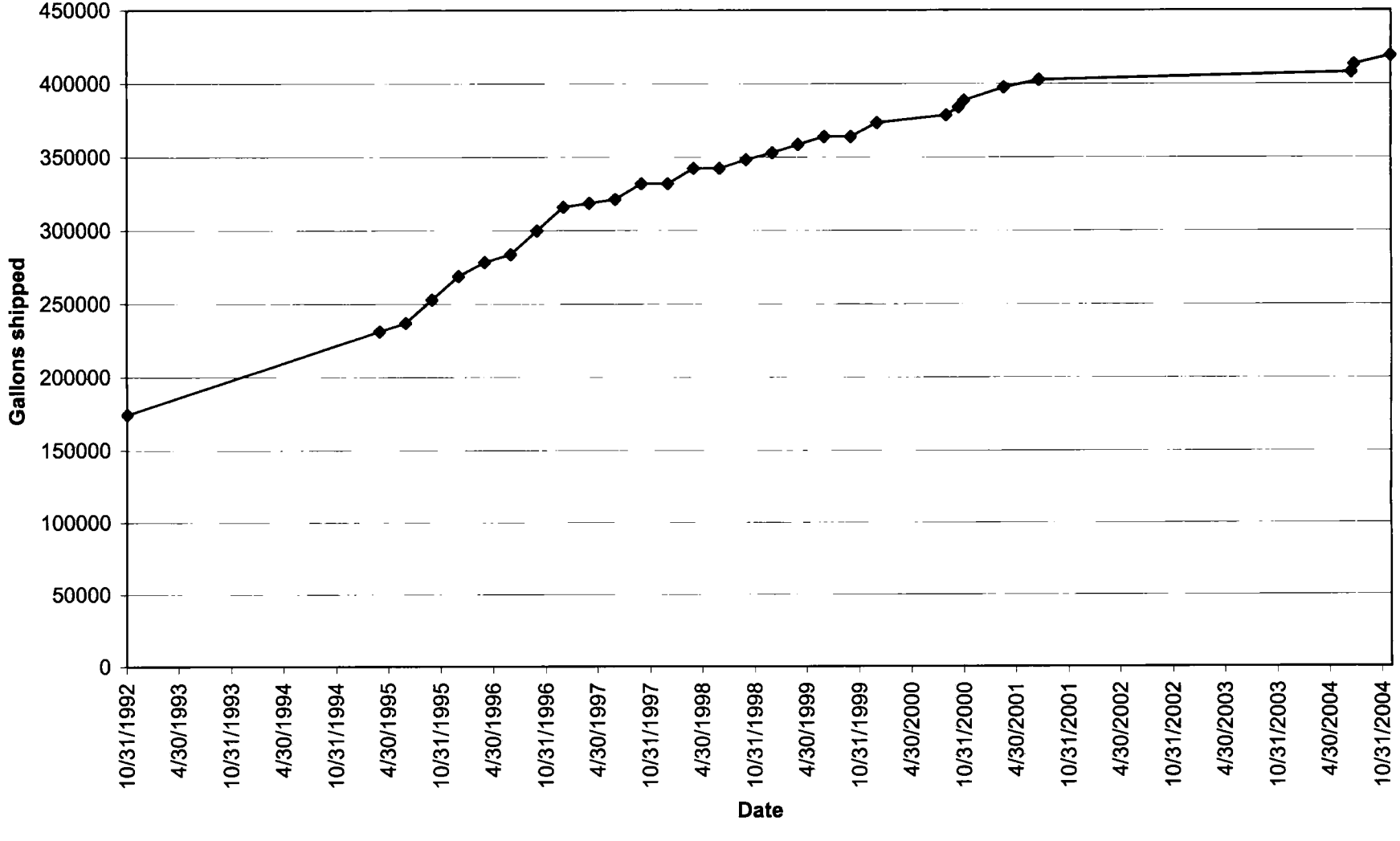
SHALLOW GROUNDWATER EXTRACTION SYSTEM

216 PATERSON PLANK ROAD SITE

FIGURE 6

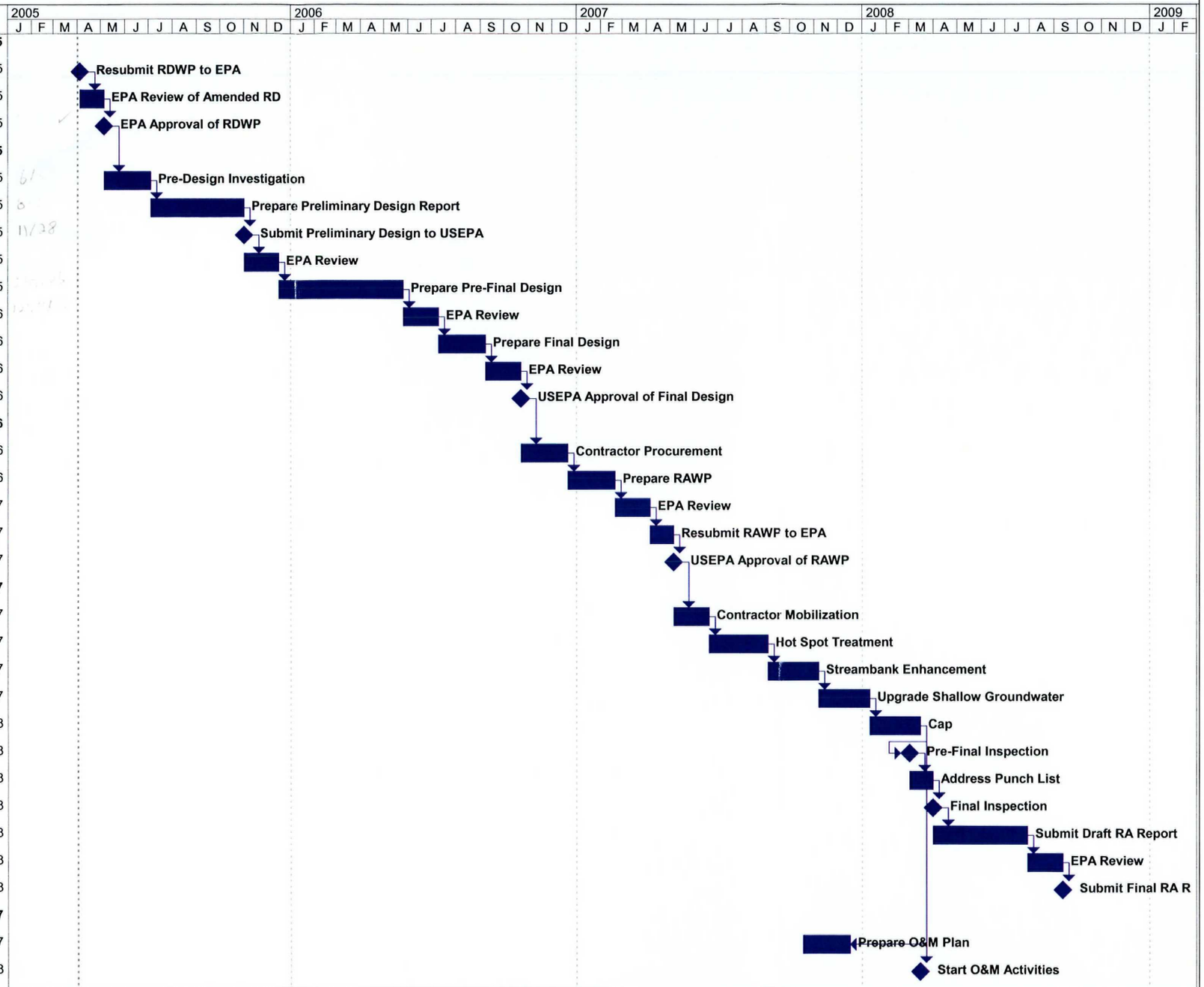
Drawing file: 9436222E004.DWG Apr 01, 2005 - 12:23pm

Figure 7
Groundwater Treatment Volumes



Remedial Design / Remedial Action Schedule

Task Name	Duration	Start
REMEDIAL DESIGN WORK PLAN (RDWP) ACTIVITIES	**31 days**	**Mon 4/4/05**
Resubmit RDWP to EPA	0 days	Mon 4/4/05
EPA Review of Amended RD	31 days	Mon 4/4/05
EPA Approval of RDWP	0 days	Thu 5/5/05
REMEDIAL DESIGN (RD) ACTIVITIES	**535 days**	**Thu 5/5/05**
Pre-Design Investigation	60 days	Thu 5/5/05
Prepare Preliminary Design Report	120 days	Mon 7/4/05
Submit Preliminary Design to USEPA	0 days	Tue 11/1/05
EPA Review	45 days	Tue 11/1/05
Prepare Pre-Final Design	160 days	Fri 12/16/05
EPA Review	45 days	Thu 5/25/06
Prepare Final Design	60 days	Sun 7/9/06
EPA Review	45 days	Thu 9/7/06
USEPA Approval of Final Design	0 days	Sun 10/22/06
REMEDIAL ACTION WORK PLAN (RAWP) ACTIVITIES	**195 days**	**Sun 10/22/06**
Contractor Procurement	60 days	Sun 10/22/06
Prepare RAWP	60 days	Thu 12/21/06
EPA Review	45 days	Mon 2/19/07
Resubmit RAWP to EPA	30 days	Thu 4/5/07
USEPA Approval of RAWP	0 days	Sat 5/5/07
REMEDIAL ACTION (RA) ACTIVITIES	**496 days**	**Sat 5/5/07**
Contractor Mobilization	45 days	Sat 5/5/07
Hot Spot Treatment	75 days	Tue 6/19/07
Streambank Enhancement	65 days	Sun 9/2/07
Upgrade Shallow Groundwater	65 days	Tue 11/6/07
Cap	65 days	Thu 1/10/08
Pre-Final Inspection	0 days	Sat 3/1/08
Address Punch List	30 days	Sat 3/1/08
Final Inspection	0 days	Mon 3/31/08
Submit Draft RA Report	120 days	Mon 3/31/08
EPA Review	45 days	Tue 7/29/08
Submit Final RA Report	0 days	Fri 9/12/08
O&M ACTIVITIES	**150 days**	**Wed 10/17/07**
Prepare O&M Plan	60 days	Wed 10/17/07
Start O&M Activities	0 days	Sat 3/15/08



Actual schedule dates will be dependent on EPA's review time for each deliverable. RA schedule is dependent on required permit equivalences and aproved contractor schedule. All field activities are dependent on weather conditions.

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Figure 8
Remedial Design/Remedial Action Schedule
216 Paterson Plank Road Site

APPENDIX A

SUMMARY OF SHALLOW GROUNDWATER AND SURFACE WATER QUALITY

TABLE A-1
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
VOLATILE ORGANIC COMPOUNDS

SAMPLE ID	LOCATION	SAMPLING DATE										
		Jun-92	Oct-92	Jan-93	Apr-93	Aug-93	Nov-93	Apr-94	Jan-95	Apr-95	Jul-95	Nov-95
MW-8S	Off-Property	ND	1,2-Dichloroethene 2 benzene 1 Total Xylenes 1	1,1-dichloroethane 1 benzene 4 chlorobenzene 3 chloroform 3 toluene 3	1,1-dichloroethane 3 1,2-Dichloroethene 58 benzene 0.8 carbon tetrachloride 1 toluene 1 Trichloroethene 13 vinyl chloride 47	1,1-dichloroethane 2 1,2-Dichloroethene 3	1,2-Dichloroethene 2	ND	ND	ND	1,2-Dichloroethene 2 Methylene chloride 5	1,2-Dichloroethene 1 Methylene Chloride 2*
MW-9S	Off-Property	ND	Total Xylenes 2	ND	1,1,2,2-Tetrachloroethane 7 4-Methyl-2-Pentanone 16 2-Hexanone 19	ND	ND	ND	ND	ND	acetone 11 Methylene chloride 3	1,2-Dichloroethene 1 Methylene Chloride 2*
MW-10S	Off-Property	ND	ND	ND	ND	carbon disulfide 1	ND	ND	ND	ND	Methylene chloride 4	Methylene Chloride 2*
MW-11S	Off-Property	ND	ND	benzene 3 chlorobenzene 2 toluene 3	toluene 1 Total Xylenes 7	ND	ND	ND	ND	ND	carbon disulfide 1 Methylene chloride 3	1,2-Dichloroethene 1 Methylene Chloride 1* Trichloroethene 1
MW-12S	Off-Property	ND	1,1,1-trichloroethane 2 1,2-Dichloroethene 4 benzene 2 ethylbenzene 2 styrene 2 tetrachloroethene 2	ND	ND	ND	ND	ND	ND	ND	Methylene chloride 5	Acetone 5* Methylene Chloride 1*

SAMPLE ID	LOCATION	SAMPLING DATE				
		Jan-96	Apr-96	Sep-96	Dec-96	Feb-97
MW-8S	Off-Property	Methylene Chloride 1	1,2-Dichloroethene 2 Methylene chloride 2	Methylene Chloride 1 Trichloroethene 2	ND	acetone 57
MW-9S	Off-Property	Acetone 46 Methylene Chloride 1*	Methylene chloride 2	Carbon Disulfide 1	ND	Methylene chloride 1
MW-10S	Off-Property	ND	Methylene chloride 2	ND	Acetone 7	ND
MW-11S	Off-Property	Methylene Chloride 1	Methylene Chloride 2	ND	Acetone 17	ND
MW-12S	Off-Property	Methylene Chloride 1	ND	ND	Acetone 18	ND

All units in ug/l.

*analyte was found in the associated blank as well as in the sample

Concentration exceeds Class II-A Groundwater Quality Standards. Class II-A standards are referred to here for comparison purposes only. Class II-A is effectively the most stringent standard and the hydrogeologic setting of the shallow fill is such that less stringent Class III-B standards would likely apply.

Tables Checked by: APJ and BJS

TABLE A-1
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
VOLATILE ORGANIC COMPOUNDS

SAMPLE ID	LOCATION	SAMPLING DATE										
		Apr-97	Jul-97	Nov-97	Mar-98	Apr-98	Jul-98	Oct-98	Mar-99	Jul-99	Sep-99	Dec-99
MW-8S	Off-Property	Acetone 6*	Acetone 36 Methylene Chloride 1 trans-1,2-Dichloroethene 2	Acetone 40	methylene chloride 1	Acetone 10 Methylene Chloride 5	Acetone 10 Methylene Chloride 1	ND	ND	ND	ND	ND
MW-9S	Off-Property	Acetone 22*	ND	Acetone 8	methylene chloride 1	Acetone 4 Methylene Chloride 2	Methylene Chloride 2	ND	ND	ND	ND	2-Butanone (MEK) 1
MW-10S	Off-Property	ND	Acetone 33 Methylene Chloride 2	Acetone 12	methylene chloride 2	Acetone 2 Methylene Chloride 3	Acetone 9 Methylene Chloride 2	ND	ND	ND	ND	2-Butanone (MEK) 1
MW-11S	Off-Property	ND	Acetone 30	acetone 11	methylene chloride 2	Acetone 14 Methylene Chloride 4	Methylene Chloride 2	cis-1,2-Dichloroethene 3 Trichloroethene 1	ND	ND	ND	2-Butanone (MEK) 4
MW-12S	Off-Property	ND	Acetone 18 Methylene Chloride 2	ND	methylene chloride 1	Acetone 4 Methylene Chloride 4	Acetone 8 Methylene Chloride 2	Benzene 1	ND	ND	ND	ND

SAMPLE ID	LOCATION	SAMPLING DATE					
		Dec-00	Mar-01	Nov-01	Sep-02	Nov-03	Nov-04
MW-8S	Off-Property	1,1-Dichloroethane 1 1,1-Dichloroethene 1 1,2-Dichloroethane 7 Cis-1,2-Dichloroethene 9 Tetrachloroethene 11 Trichloroethene 16	ND	ND	Benzene 0.5 cis-1,2-Dichloroethene 0.2 Trans-1,2-Dichloroethene 0.2	Toluene 1	ND
MW-9S	Off-Property	ND	Not Sampled	ND	cis-1,2-Dichloroethene 0.2	Toluene 0.9 2-Butanone (MEK) 4	ND
MW-10S	Off-Property	ND	Not Sampled	ND	Benzene 0.3 cis-1,2-Dichloroethene 0.2	ND	Tetrachloroethene 2 Trichloroethene 4
MW-11S	Off-Property	ND	Not Sampled	cis-1,2-Dichloroethene 1	ND	Tetrachloroethene 0.9 Toluene 3	cis-1,2-Dichloroethene 2 Acetone 6 Trichloroethene 1
MW-12S	Off-Property	ND	Not Sampled	cis-1,2-Dichloroethene 0.8	ND	Toluene 1	ND

All units in ug/l.

*analyte was found in the associated blank as well as in the sample

Concentration exceeds Class II-A Groundwater Quality Standards. Class II-A standards are referred to here for comparison purposes only. Class II-A is effectively the most stringent standard and the hydrogeologic setting of the shallow fill is such that less stringent Class III-B standards would likely apply.

Tables Checked by: APJ and BJS

TABLE A-2
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY
SUMMARY OF SURFACE WATER QUALITY DATA
VOLATILE ORGANIC COMPOUNDS

SAMPLE ID (Location)	SAMPLING DATE									
	Jul-87- Pre-IRM	Dec-87-Pre-IRM	Jun-92 1st O&M	Oct-92 2nd O&M	Jan-93 3rd O&M	Apr-93 4th O&M	Aug-93 5th O&M	Nov-93 6th O&M	Apr-94 7th O&M	Jan-95 8th O&M
SW-01	1,2-trans-DCE 3.78 Methylene Chloride 17	1,2-trans-DCE 3.91 Methylene Chloride 14.9	1,2-Dichloroethene 3	ND	ND	1,2-Dichloroethene 3	ND	1,2-Dichloroethene 3 Toluene 1	Acetone 12	1,2-Dichloroethene 2 Benzene 1 Chlorobenzene 2 Methylene Chloride 1 Toluene 2 Trichloroethene 4
SW-02	1,1-Dichloroethane 5.27 1,2-trans-DCE 6.69	1,1,1-Trichloroethane 5.54 1,1-Dichloroethane 15.3 1,2-trans-DCE 33.3 Chlorobenzene 12.2 Chloroform 3.56 Methylene Chloride 12.9 Toluene 48.1	1,2-Dichloroethene 2 Trichloroethene 1	1,2-Dichloroethene 1	1,2-Dichloroethene 4	1,1,1-Trichloroethane 2 Toluene 1 Total Xylenes 4 4-Methyl-2-Pentanone 4 2-Butanone (MEK) 5	ND	1,2-Dichloroethene 2	Acetone 37	1,2-Dichloroethene 2 Toluene 1
SW-03	1,1,1-Trichloroethane 12.9 1,2-trans-DCE 9.56 Chloroform 1.84 Methylene Chloride 12.1	1,1,1-Trichloroethane 6.32 1,1-Dichloroethane 13.7 1,2-trans-DCE 35.2 Chlorobenzene 8.34 Chloroform 3.58 Methylene Chloride 6.12 Toluene 20.6 Trichloroethene 3.83	tetrachloroethene 2	ND	1,2-Dichloroethene 3 2-Butanone (MEK) 9 Toluene 2	1,1,1-Trichloroethane 2 4-Methyl-2-Pentanone 5 Toluene 1 Total Xylenes 3	ND	ND	Acetone 52	1,2-Dichloroethene 3 Toluene 2
SW-04	1,1,1-Trichloroethane 5.42 1,2-trans-DCE 8.46 Methylene Chloride 10.6	Methylene Chloride 4.6	ND	1,2-Dichloroethene 4	2-Butanone (MEK) 9	1,1,1-Trichloroethane 2 Total Xylenes 3	Toluene 1	1,1,1-Trichloroethane 1	2-Butanone (MEK) 55	1,2-Dichloroethene 1 Toluene 2

SAMPLE ID (Location)	SAMPLING DATE									
	Apr-95 9th O&M	Jul-95 10th O&M	Nov-95 11th O&M	Jan-96 12th O&M	Apr-96 13th O&M	Sep-96 14th O&M	Dec-96 15th O&M	Feb-97 16th O&M	Apr-97 17th O&M	Jul-97 18th O&M
SW-01	1,2-Dichloroethene 2	1,2-Dichloroethene 1 Methylene Chloride 6* Acetone 3	1,2-Dichloroethene 1	Acetone 46 Methylene Chloride 1 Tetrachloroethene 2 Toluene 2	Methylene Chloride 2	Acetone 10 Methylene Chloride 2*	1,2-Dichloroethene 2 Benzene 1 Chlorobenzene 1 Toluene 5 Total Xylenes 2	Acetone 61 cis-1,2-Dichloroethene 2 Toluene 1	cis-1,2-Dichloroethene 2 Methylene Chloride 1	2-Butanone (MEK) 3 Acetone 12 Methylene Chloride 1
SW-02	Acetone 380	Acetone 10 Methylene Chloride 2* Toluene 4 Total Xylenes 1	1,2-Dichloroethene 4 Chlorobenzene 1 Ethylbenzene 0.5 Toluene 13 Total Xylenes 4 Vinyl Chloride 4	1,2-Dichloroethene 4 Acetone 30 Methylene Chloride 1 Tetrachloroethene 1 Toluene 3 Total Xylenes 1 Trichloroethene 1	1,2-Dichloroethene 6 Acetone 11 Methylene Chloride 2 Toluene 7 Total Xylenes 1	Acetone 47 Methylene Chloride 7* Toluene 1	1,2-Dichloroethene 2 4-methyl-2-pentanone 3 Acetone 16 Benzene 1 Toluene 5 Total Xylenes 2	Acetone 42 cis-1,2-Dichloroethene 2 Toluene 1	cis-1,2-Dichloroethene 3 Methylene Chloride 4 Toluene 2	Acetone 99 Methylene Chloride 1
SW-03	Acetone 410	2-Butanone (MEK) 1 Acetone 6 Methylene Chloride 2* Toluene 2 Total Xylenes 1	1,2-Dichloroethene 4 Chlorobenzene 1 Toluene 16 Total Xylenes 4 Vinyl Chloride 4	1,1,1-Trichloroethane 2 1,1-Dichloroethane 2 1,2-Dichloroethene 10 Acetone 39 Chloroform 1 Methylene Chloride 4 Tetrachloroethene 1 Toluene 16 Total Xylenes 6 Vinyl Chloride 3	1,1,1-Trichloroethane 2 1,1-Dichloroethane 3 1,2-Dichloroethene 22 Chlorobenzene 4 Chloroform 2 Ethylbenzene 2 Toluene 52 Total Xylenes 11 Vinyl Chloride 8	Acetone 7 Methylene Chloride 2*	1,2-Dichloroethene 2 2-Butanone (MEK) 8 Acetone 29 Toluene 3 Total Xylenes 1	Acetone 49 Chlorobenzene 1 cis-1,2-Dichloroethene 9 Toluene 12 Total Xylenes 2	1,1-Dichloroethane 2 Acetone 7* Chlorobenzene 2 cis-1,2-Dichloroethene 10 Methylene Chloride 4 Toluene 14 Total Xylenes 5 Vinyl Chloride 4	2-Butanone (MEK) 5
SW-04	Acetone 600	2-Butanone (MEK) 2 Acetone 8 Methylene Chloride 1*	Toluene 2	No Sample	2-Butanone (MEK) 14 Acetone 10 Methylene Chloride 2 Toluene 1	2-Butanone (MEK) 10 Acetone 15 Methylene Chloride 2*	Acetone 21 Benzene 1 Toluene 2 Total Xylenes 2	Acetone 27 cis-1,2-Dichloroethene 4 Toluene 5	Acetone 23* Methylene Chloride 31	2-Butanone (MEK) 6 Methylene Chloride 1

Notes:
All units in ug/l (parts per billion).
(1) - Pre-IRM VOC analysis method was for priority pollutants which do not include acetone.
*analyte was found in the associated blank as well as in the sample
Concentration exceeds Class SE surface water quality standard.
Tables Checked by: APJ and BJS

TABLE A-2
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY
SUMMARY OF SURFACE WATER QUALITY DATA
VOLATILE ORGANIC COMPOUNDS

SAMPLE ID (Location)	SAMPLING DATE									
	Nov-97 19th O&M	Mar-98 20th O&M	Apr-98 21st O&M	Jul-98 22nd O&M	Oct-98 23rd O&M	Mar-99 24th O&M	Jul-99 25th O&M	Sep-99 26th O&M	Dec-99 27th O&M	Mar-00 28th O&M
SW-01	Acetone 14 cis-1,2-Dichloroethene 1 Toluene 1	cis-1,2-Dichloroethene 2 Trichloroethene 2	ND	ND	ND	ND	2-Butanone (MEK) 2	ND	cis-1,2-Dichloroethene 3 Toluene 1	Acetone 31
SW-02	Methylene Chloride 1	Acetone 4 Chlorobenzene 1 cis-1,2-Dichloroethene 5 Methylene Chloride 1 Toluene 4 Total Xylenes 1	ND	Methylene Chloride 2	Benzene 7 Trichloroethene 2	cis-1,2-Dichloroethene 4 Toluene 2	2-Butanone (MEK) 8 Acetone 17	ND	Chlorobenzene 1 cis-1,2-Dichloroethene 2 Toluene 4 Vinyl Chloride 2	Acetone 7
SW-03	Acetone 7 cis-1,2-Dichloroethene 1 Toluene 6 Total Xylenes 1	Acetone 5 cis-1,2-Dichloroethene 2 Methylene Chloride 1 Toluene 1	cis-1,2-Dichloroethene 3 Methylene Chloride 2 Toluene 3	Methylene Chloride 1	Benzene 3	Chlorobenzene 1 cis-1,2-Dichloroethene 6 MIBK 2 Toluene 5 Total Xylenes 1 Vinyl Chloride 1	2-Butanone (MEK) 10 Acetone 19 Toluene 2	4-Methyl-2-pentanone 3 Acetone 14	1,1-Dichloroethane 1 Chlorobenzene 2 Chloromethane 1 cis-1,2-Dichloroethene 4 Toluene 6 Total Xylenes 3 Vinyl Chloride 5	2-Butanone (MEK) 6 Acetone 8 cis-1,2-Dichloroethene 1
SW-04	Acetone 13 Methylene Chloride 1 Toluene 3	Acetone 5 cis-1,2-Dichloroethene 1 Methylene Chloride 1	ND	Methylene Chloride 2	ND	Chlorobenzene 1 cis-1,2-Dichloroethene 8 MIBK 2 Toluene 6 Total Xylenes 2 Vinyl Chloride 1	NO SAMPLE	4-Methyl-2-pentanone 4 Acetone 13	Chlorobenzene 1 cis-1,2-Dichloroethene 1 Toluene 3 Vinyl Chloride 2	2-Butanone (MEK) 10 Acetone 10 cis-1,2-Dichloroethene 1 Toluene 1

SAMPLE ID (Location)	SAMPLING DATE									
	May-00 29th O&M	Aug-00 30th O&M	Dec-00 31st O&M	Mar-01 32nd O&M	May-01 33rd O&M	Aug-01 34th O&M	Nov-01 35th O&M	Feb-02 36th O&M	May-02 37th O&M	Jul-02 38th O&M
SW-01	ND	ND	ND	cis-1,2-Dichloroethene 1	ND	Acetone 6	ND	Acetone 10 cis-1,2-Dichloroethene 1	Acetone 44 cis-1,2-Dichloroethene 1 Toluene 0.6	ND
SW-02	Toluene 2	ND	Chloromethane 2 Cis-1,2-Dichloroethene 1	cis-1,2-Dichloroethene 3 Toluene 2	ND	Acetone 6 Toluene 0.2	ND	Acetone 12 cis-1,2-Dichloroethene 1	2-Butanone (MEK) 5 Acetone 200 Chlorobenzene 0.8 cis-1,2-Dichloroethene 0.4 Toluene 3	Toluene 0.3
SW-03	Acetone 36* cis-1,2-Dichloroethene 1 Toluene 2	ND	Cis-1,2-Dichloroethene 1 Methylene chloride 1	cis-1,2-Dichloroethene 3 Toluene 2	ND	Acetone 7 Chloromethane 1 Toluene 0.4	ND	2-Butanone (MEK) 6 Acetone 19 cis-1,2-Dichloroethene 2	Acetone 91 Toluene 1	Acetone 5 Chlorobenzene 0.5 Toluene 2
SW-04	2-Butanone (MEK) 4 Acetone 60* Toluene 1	ND	Cis-1,2-Dichloroethene 2	cis-1,2-Dichloroethene 3 Toluene 2	ND	Acetone 10 Toluene 0.4	cis-1,2-Dichloroethene 1	2-Butanone (MEK) 7 Acetone 20 cis-1,2-Dichloroethene 2	Acetone 110 Chlorobenzene 0.6 cis-1,2-Dichloroethene 0.4 Toluene 1	2-Hexanone 4 Acetone 8 Chlorobenzene 0.5 Toluene 0.6

Notes:
All units in ug/l (parts per billion).
(1) - Pre-IRM VOC analysis method was for priority pollutants which do not include acetone.
*analyte was found in the associated blank as well as in the sample
Concentration exceeds Class SE surface water quality standard.
Tables Checked by: APJ and BJS

TABLE A-2
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY
SUMMARY OF SURFACE WATER QUALITY DATA
VOLATILE ORGANIC COMPOUNDS

SAMPLE ID (Location)	SAMPLING DATE									
	Sep-02 39th O&M	Apr-03 40th O&M	Jun-03 41st O&M	Sep-03 42nd O&M	Nov-03 43rd O&M	Mar-04 44th O&M	Jun-04 45th O&M	Aug-04 46th O&M	Nov-04 47th O&M
SW-01	Chloromethane 0.2	1,2-Dichlorobenzene 0.6 2-Butanone (MEK) 4 Chloroform 0.4 cis-1,2-Dichloroethene 1 Methylene chloride 0.3 Tetrachloroethene 0.5 Trichloroethene 0.5	cis-1,2-Dichloroethene 0.6 Trichloroethene 0.3	Tetrachloroethene 0.4	Chloroform 0.2 cis-1,2-Dichloroethene 0.4 Vinyl Chloride 0.2	ND	ND	ND	ND
SW-02	Chloromethane 0.3	1,2-Dichlorobenzene 0.7 2-Butanone (MEK) 5 2-Hexanone 2 Bromodichloromethane 0.2 Chloroform 0.6 cis-1,2-Dichloroethene 3 Methylene Chloride 0.4 Tetrachloroethene 0.7 Trichloroethene 0.6 Vinyl chloride 0.3	2-Butanone (MEK) 2 Bromodichloromethane 1 Chlorobenzene 0.4 Chloroform 3 cis-1,2-Dichloroethene 0.5 Total Xylenes 0.7 Vinyl chloride 0.3	ND	ND	Acetone 10 Bromodichloromethane 2 Chloroform 3	ND	Acetone 8 Bromodichloromethane 1 Chloroform 7	ND
SW-03	Chloroform 0.2 cis-1,2-Dichloroethene 0.2	1,1-Dichloroethane 0.3 2-Butanone (MEK) 6 Bromodichloromethane 2 Chlorobenzene 1 Chloroethane 0.2 Chloroform 4 cis-1,2-Dichloroethene 2 Ethylbenzene 0.3 Methylene Chloride 0.7 Total Xylenes 1 Trichloroethene 0.2 Vinyl chloride 0.5	Chloroform 0.3	2-Butanone (MEK) 4 Bromodichloromethane 2 Chloroform 6 cis-1,2-Dichloroethene 0.3	Bromodichloromethane 7 Carbon Disulfide 0.2 Chloroform 11 Dibromochloromethane 2	Acetone 9 Bromodichloromethane 1 Chloroform 1	Bromodichloromethane 3 Chloroform 7	Acetone 10 Bromodichloromethane 2 Chloroform 11	ND
SW-04	cis-1,2-Dichloroethene 0.2	1,1-Dichloroethane 0.1 2-Butanone (MEK) 8 2-Hexanone 2 4-Methyl-2-pentanone 1 Bromodichloromethane 2 Chloroform 4 cis-1,2-Dichloroethene 0.7 Methylene Chloride 0.6 Vinyl chloride 0.2	2-Butanone (MEK) 4 2-hexanone 1 Chloroform 0.5	Bromodichloromethane 1 Chlorobenzene 0.4 Chloroform 4	Bromodichloromethane 1 Chlorobenzene 0.3 Chloroform 3 cis-1,2-Dichloroethene 0.3 Vinyl Chloride 0.2	Acetone 10 Chloroform 1	Chloroform 2	Acetone 19 Chloroform 4	ND

Notes:
All units in ug/l (parts per billion).
(1) - Pre-IRM VOC analysis method was priority pollutants which does not include acetone.
*analyte was found in the associated blank as well as in the sample
Concentration exceeds Class SE surface water quality standard.
Tables Checked by: APJ and BJS

TABLE A-3
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
SEMI-VOLATILE ORGANIC COMPOUNDS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATES									
		Jun-92	Oct-92	Jan-93	Apr-93	Aug-93	Nov-93	Apr-94	Jan-95	Apr-95	Apr-96
MW-8S	Off-Property	ND	ND	ND	ND	ND	ND	bis(2-ethylhexyl)Phthalate 4	bis(2-Ethylhexyl)Phthalate 2	ND	bis(2-Ethylhexyl)Phthalate 5
MW-9S	Off-Property	2-Methylnaphthalene 12 Acenaphthene 14 Dibenzofuran 11 Diethylphthalate 19 Dimethylphthalate 7 Fluorene 11 Naphthalene 2 Phenanthrene 9	2-Methylnaphthalene 9 Acenaphthene 10 Dibenzofuran 7 Fluorene 7 Naphthalene 1 Phenanthrene 6	2-Methylnaphthalene 3 4-Chlorophenyl-phenylether 3 Acenaphthene 5 Dibenzofuran 3 Phenanthrene 2	2-Methylnaphthalene 3 Acenaphthene 4 bis(2-ethylhexyl)Phthalate 4 Dibenzofuran 2 Fluorene 2 Naphthalene 1 Phenanthrene 0.8	2-Methylnaphthalene 7 Acenaphthene 11 Dibenzofuran 8 Fluorene 8 Naphthalene 2 Phenanthrene 7	2-Methylnaphthalene 14 Acenaphthene 15 Dibenzofuran 12 Fluoranthene 1 Fluorene 12 Naphthalene 2 Phenanthrene 11	2-Methylnaphthalene 4 Acenaphthene 6 Dibenzofuran 4 Fluorene 4 Naphthalene 0.9 Phenanthrene 3	Acenaphthene 10 bis(2-Ethylhexyl)Phthalate 4 Dibenzofuran 6 Fluoranthene 1 Fluorene 6 2-Methylnaphthalene 9 Phenanthrene 3	2-Methylnaphthalene 7 Acenaphthene 11 bis(2-Ethylhexyl)Phthalate 4 Dibenzofuran 7 Fluoranthene 1 Fluorene 6 Phenanthrene 2	2-Methylnaphthalene 4 Acenaphthene 5 bis(2-Ethylhexyl)Phthalate 7 Dibenzofuran 4 Di-n-butylphthalate 0.7 Fluoranthene 0.8 Fluorene 4 Phenanthrene 5 Phenol 2 Pyrene 0.5
MW-10S	Off-Property	ND	ND	ND	ND	ND	bis(2-ethylhexyl)Phthalate 11	ND	bis(2-Ethylhexyl)Phthalate 5	ND	2-Methylphenol 2 4-Methylphenol 4 bis(2-Ethylhexyl)Phthalate 1
MW-11S	Off-Property	bis(2-ethylhexyl)Phthalate 66 Di-n-Octylphthalate 5	ND	ND	ND	ND	ND	ND	bis(2-Ethylhexyl)Phthalate 2	bis(2-Ethylhexyl)Phthalate 14 Di-n-butylphthalate 2	bis(2-Ethylhexyl)Phthalate 1
MW-12S	Off-Property	Diethylphthalate 7 Dimethylphthalate 3	ND	ND	ND	ND	ND	ND	Di-n-butylphthalate 2	ND	bis(2-Ethylhexyl)Phthalate 2

SAMPLE ID	LOCATION	SAMPLING DATES								
		Sep-96	Nov-97	Oct-98	Dec-99	Dec-00	Nov-01	Sep-02	Nov-03	Nov-04
MW-8S	Off-Property	ND	bis(2-Ethylhexyl)Phthalate 2	ND	ND	bis(2-Ethylhexyl)phthalate 2	ND	ND	ND	ND
MW-9S	Off-Property	2-Methylnaphthalene 19 Acenaphthene 21 Anthracene 2 Dibenzofuran 17 Fluoranthene 1 Fluorene 19 Phenanthrene 18	2-Methylnaphthalene 13 Acenaphthene 14 Dibenzofuran 9 Fluoranthene 0.7 Fluorene 11 Phenanthrene 7	2-Methylnaphthalene 20 Acenaphthene 18 Anthracene 1 Dibenzofuran 15 Fluoranthene 1 Fluorene 14 Phenanthrene 15	2-Methylnaphthalene 7.8 Acenaphthene 16.4 Anthracene 1.2 Dibenzofuran 11.9 Fluoranthene 1.2 Fluorene 13.6 Phenanthrene 12.6	2-Methylnaphthalene 8 Acenaphthene 12 Anthracene 1 bis(2-Ethylhexyl)phthalate 1 Dibenzofuran 10 Fluoranthene 1 Fluorene 9 Phenanthrene 6	2-Methylnaphthalene 12 Acenaphthene 15 Anthracene 1 Dibenzofuran 11 Fluoranthene 2 Fluorene 14 Phenanthrene 13 Pyrene 0.9	2-Methylnaphthalene 17 Acenaphthene 23 Anthracene 2 Dibenzofuran 19 Fluoranthene 2 Fluorene 20 Phenanthrene 19 Pyrene 1	2-Methylnaphthalene 14 Acenaphthene 19 Dibenzofuran 15 Fluoranthene 2 Fluorene 17 Phenanthrene 16	2-Methylnaphthalene 13 Acenaphthene 23 Anthracene 2 Dibenzofuran 16 Fluoranthene 2 Fluorene 19 Phenanthrene 22
MW-10S	Off-Property	Di-n-butylphthalate 1	bis(2-Ethylhexyl)Phthalate 2	ND	ND	bis(2-Ethylhexyl)phthalate 2	Pyrene 0.2	Acenaphthene 0.4 bis(2-ethylhexyl)phthalate 0.9 Fluoranthene 0.2 Pyrene 0.2	ND	ND
MW-11S	Off-Property	4-Methylphenol 1 Phenol 2	Phenol 2	ND	ND	ND	Benzo(a)pyrene 0.2 Butylbenzyl phthalate 0.2 Fluoranthene 0.5 Pyrene 0.3	ND	ND	Di-n-butylphthalate 3
MW-12S	Off-Property	ND	ND	ND	ND	ND	ND	ND	ND	ND

All units are in ug/l

Concentration exceeds Class II-A Groundwater Quality Standards. Class II-A standards are referred to here for comparison purposes only. Class II-A is effectively the most stringent standard and the hydrogeologic setting of the shallow fill is such that less stringent Class III-B standards would likely apply.

Tables Checked by: APJ and BJS

TABLE A-4
216 PATERSON PLANK ROAD SITE
SUMMARY OF SURFACE WATER QUALITY DATA
SEMI-VOLATILE ORGANIC COMPOUNDS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATES									
		Jun-92	Oct-92	Jan-93	Apr-93	Aug-93	Nov-93	Apr-94	Jan-95	Apr-95	Apr-96
SW-01	Off-Property	ND	ND	ND	ND	ND	bis(2-ethylhexyl)Phthalate 4	ND	ND	ND	bis(2-Ethylhexyl)Phthalate 2
SW-02	Off-Property	ND	ND	bis(2-ethylhexyl)Phthalate 10	bis(2-ethylhexyl)Phthalate 19	ND	ND	bis(2-ethylhexyl)Phthalate 3	ND	ND	ND
SW-03	Off-Property	ND	ND	bis(2-ethylhexyl)Phthalate 4	bis(2-ethylhexyl)Phthalate 2	ND	ND	ND	ND	ND	bis(2-Ethylhexyl)Phthalate 2 Pyrene 1
SW-04	Off-Property	ND	ND	bis(2-ethylhexyl)Phthalate 2	ND	ND	ND	ND	ND	bis(2-ethylhexyl)Phthalate 3	bis(2-Ethylhexyl)Phthalate 1

SAMPLE ID	LOCATION	SAMPLING DATES							
		Nov-97	Oct-98	Dec-99	Dec-00	Nov-01	Sep-02	Nov-03	Nov-04
SW-01	Off-Property	ND	ND	ND	ND	ND	bis(2-ethylhexyl)Phthalate 4	ND	ND
SW-02	Off-Property	ND	ND	ND	bis(2-Ethylhexyl)phthalate 2	ND	ND	ND	Di-n-butylphthalate 5
SW-03	Off-Property	bis(2-Ethylhexyl)Phthalate 1	ND	ND	ND	bis(2-Ethylhexyl)phthalate 0.8	ND	4-Methylphenol 5 Diethylphthalate 5 Phenanthrene 2	Isophorone 2
SW-04	Off-Property	bis(2-Ethylhexyl)Phthalate 1	ND	ND	bis(2-Ethylhexyl)phthalate 2	bis(2-Ethylhexyl)phthalate 4	ND	ND	ND

*analyte was found in the associated blank as well as in the sample
Concentration exceeds Class SE surface water quality standard.
Tables Checked by: APJ and BJS

TABLE A-5
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
PCBs / PESTICIDES
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATA									
		Jun-92	Oct-92	Jan-93	Apr-93	Aug-93	Nov-93	Apr-94	Jan-95	Apr-95	Apr-96
MW-8S	Off-Property	ND	ND	ND	ND	ND	ND	ND	ND	ND	delta-BHC 0.023 Heptachlor Epoxide 0.0066
MW-9S	Off-Property	ND	ND	ND	ND	ND	ND	ND	ND	Endosulfan sulfate 0.006	delta-BHC 0.0036
MW-10S	Off-Property	ND	ND	ND	ND	ND	ND	ND	ND	chlordane 0.006 Endosulfan sulfate 0.011	delta-BHC 0.0026
MW-11S	Off-Property	ND	ND	ND	ND	ND	ND	ND	4,4'-DDD 0.0067 4,4'-DDE 0.0048 4,4'-DDT 0.0071 Dieldrin 0.0071 Endosulfan II 0.0029 Endrin 0.012 gamma-BHC (Lindane) 0.0015* Methoxychlor 0.007	ND	ND
MW-12S	Off-Property	ND	ND	ND	ND	ND	ND	ND	4.4'-DDT 0.0025 chlordane 0.0016 Dieldrin 0.0038	ND	ND

SAMPLE ID	LOCATION	SAMPLING DATA								
		Sep-96	Nov-97	Oct-98	Dec-99	Dec-00	Nov-01	Sep-02	Nov-03	Nov-04
MW-8S	Off-Property	ND	4,4'-DDE 0.022 4,4'-DDT 0.0099 beta-BHC 0.044 delta-BHC 0.028 Heptachlor Epoxide 0.048	delta-BHC 0.056	ND	ND	beta-BHC 0.061	ND	ND	ND
MW-9S	Off-Property	ND	alpha-BHC 0.008 delta-BHC 0.025 Endosulfan I 0.0054 gamma-BHC (Lindane) 0.0024 Methoxychlor 0.014	ND	ND	ND	ND	ND	delta-BHC 0.022	ND
MW-10S	Off-Property	ND	alpha-BHC 0.0052 delta-BHC 0.015	ND	Endrin 0.029	ND	ND	ND	ND	ND
MW-11S	Off-Property	Aldrin 0.003 Heptachlor 0.0047	4,4'-DDE 0.0062 delta-BHC 0.022 Dieldrin 0.0026 Endrin 0.005	ND	delta-BHC 0.02* Endrin aldehyde 0.012	ND	ND	ND	ND	ND
MW-12S	Off-Property	Dieldrin 0.0044	4,4'-DDE 0.01 delta-BHC 0.021 Endrin Ketone 0.0079	ND	chlordane 0.0064	ND	ND	ND	ND	ND

All units in ug/l

Concentration exceeds Class II-A Groundwater Quality Standards. Class II-A standards are referred to here for comparison purposes only. Class II-A is effectively the most stringent standard and the hydrogeologic setting of the shallow fill is such that less stringent Class III-B standards would likely apply.

Tables Checked by: APJ and BJS

TABLE A-6
216 PATERSON PLANK ROAD SITE
SUMMARY OF SURFACE WATER QUALITY DATA
PCBs/ PESTICIDES
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATES									
		Jun-92	Oct-92	Jan-93	Apr-93	Aug-93	Nov-93	Apr-94	Jan-95	Apr-95	Apr-96
SW-01	Off-Property	ND	ND	ND	ND	ND	ND	ND	4,4'-DDD 0.0073 4,4'-DDT 0.0043 Dieldrin 0.0059 Endosulfan sulfate 0.0038 Endrin aldehyde 0.0059* Heptachlor Epoxide 0.017	Alpha-BHC 0.011	delta-BHC 0.0041
SW-02	Off-Property	ND	ND	ND	ND	ND	ND	ND	4,4'-DDD 0.018 Alpha-BHC 0.0011 Dieldrin 0.0063 Endrin 0.0024 gamma-BHC (Lindane) 0.0021*	Dieldrin 0.018	delta-BHC 0.0069
SW-03	Off-Property	ND	4,4'-DDD 0.13	ND	ND	ND	ND	ND	4,4'-DDD 0.031 chlordane 0.0017 Dieldrin 0.0041 Endrin 0.0023	ND	ND
SW-04	Off-Property	ND	ND	ND	ND	ND	ND	ND	Alpha-BHC 0.0021 4,4'-DDD 0.005 Dieldrin 0.0043 gamma-BHC (Lindane) 0.011	ND	delta-BHC 0.0092

SAMPLE ID	LOCATION	SAMPLING DATES							
		Nov-97	Oct-98	Dec-99	Dec-00	Nov-01	Sep-02	Nov-03	Nov-04
SW-01	Off-Property	4,4'-DDT 0.0093 delta-BHC 0.016 Endrin 0.0039 Heptachlor Epoxide 0.0068 Methoxychlor 0.0064	ND	Delta-BHC 0.02 Endosulfan sulfate 0.013 Endrin ketone 0.014	ND	ND	ND	ND	ND
SW-02	Off-Property	4,4'-DDE 0.0066 4,4'-DDT 0.009 delta-BHC 0.02	ND	ND	ND	ND	Aroclor-1254 0.36	ND	ND
SW-03	Off-Property	4,4'-DDT 0.0072 delta-BHC 0.017 Heptachlor Epoxide 0.0036	ND	ND	Heptachlor epoxide 0.023	ND	ND	ND	ND
SW-04	Off-Property	4,4'-DDT 0.0075 delta-BHC 0.034 gamma-BHC (Lindane) 0.014 Methoxychlor 0.0098	ND	Delta-BHC 0.013	chlordane 0.013	ND	ND	ND	ND

*analyte was found in the associated blank as well as in the sample
Concentration exceeds Class SE surface water quality standard.
Tables Checked by: APJ and BJS

TABLE A-7
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATES																	
		Jun-92 1st O&M		Oct-92 2nd O&M		Jan-93 3rd O&M		Apr-93 4th O&M		Aug-93 5th O&M		Nov-93 6th O&M		Apr-94 7th O&M		Jan-95 8th O&M		Apr-95 9th O&M	
MW-8S	Off-Property	Aluminum	15800	Aluminum	15300	Aluminum	1850	Aluminum	19900	Aluminum	4720	Aluminum	8980	Aluminum	19100	Aluminum	11400	Aluminum	5010
		Arsenic	26.7	Arsenic	37.2	Arsenic	17.3	Arsenic	22	Arsenic	10.4	Arsenic	38.9	Arsenic	25.4	Antimony	2.2	Arsenic	19.2
		Barium	456	Barium	332	Barium	357	Barium	444	Barium	179	Barium	489	Barium	638	Arsenic	38.8	Barium	609
		Calcium	124000	Calcium	91400	Calcium	120000	Cadmium	12.9	Cadmium	3.1	Beryllium	0.53	Beryllium	0.34	Barium	889	Cadmium	9.1
		Chromium	39.3	Chromium	48.1	Copper	30.4	Calcium	125000	Calcium	69300	Cadmium	17.8	Cadmium	12.7	Cadmium	5.8	Calcium	180000
		Cobalt	6.4	Cobalt	6.54	Iron	6520	Chromium	50.6	Chromium	173	Calcium	137000	Calcium	214000	Calcium	184000	Chromium	21
		Copper	197	Copper	200	Lead	22.4	Cobalt	9.1	Copper	71.2	Chromium	125	Chromium	42	Chromium	30.5	Cobalt	2.8
		Iron	24900	Iron	24900	Magnesium	36900	Copper	374	Iron	6650	Cobalt	3.6	Cobalt	3.3	Cobalt	2.5	Copper	80.2
		Lead	53.2	Lead	59.1	Manganese	3120	Iron	28700	Lead	18.7	Copper	167	Copper	189	Copper	95.6	Iron	24100
		Magnesium	71600	Magnesium	53000	Nickel	15.8	Lead	87.6	Magnesium	32100	Iron	33700	Iron	23300	Iron	48600	Lead	20.6
		Manganese	2960	Manganese	1710	Potassium	12500	Magnesium	62800	Manganese	984	Lead	41.7	Lead	41.6	Lead	25.7	Magnesium	60800
		Mercury	0.59	Nickel	38.5	Sodium	173000	Manganese	2640	Nickel	86.5	Magnesium	54200	Magnesium	38700	Magnesium	52400	Manganese	5600
		Nickel	28	Potassium	23500	Zinc	67.3	Mercury	0.57	Potassium	12500	Manganese	2350	Manganese	3090	Manganese	5780	Mercury	0.2
		Potassium	28000	Sodium	359000			Nickel	25.8	Sodium	208000	Mercury	0.21	Mercury	0.14	Mercury	0.43	Nickel	18.9
		Silver	3.3	Vanadium	40.2			Potassium	17700	Vanadium	17	Nickel	64.3	Nickel	22.3	Nickel	18.5	Potassium	26600
		Sodium	458000	Zinc	190			Sodium	383000			Potassium	21200	Potassium	15300	Potassium	24200	Selenium	7.1
		Vanadium	37.2					Vanadium	55.3			Sodium	320000	Sodium	266000	Sodium	199000	Sodium	265000
		Zinc	175					Zinc	215			Vanadium	27.6	Vanadium	18.2	Vanadium	17.4	Vanadium	12.1
												Zinc	173	Zinc	124	Zinc	79.4	Zinc	99.3
MW-9S	Off-Property	Arsenic	6.8	Aluminum	1340	Aluminum	1670	Aluminum	3340	Aluminum	1600	Aluminum	996	Aluminum	3580	Aluminum	1250	Aluminum	3380
		Barium	475	Arsenic	9.05	Barium	394	Arsenic	4.6	Arsenic	5	Arsenic	5.1	Arsenic	2.7	Antimony	3.1	Arsenic	3.8
		Calcium	103000	Barium	505	Cadmium	4.4	Barium	369	Barium	733	Barium	488	Barium	565	Barium	413	Barium	536
		Chromium	10.4	Calcium	129000	Calcium	147000	Calcium	143000	Calcium	148000	Calcium	118000	Beryllium	0.25	Cadmium	5.4	Cadmium	15.5
		Copper	103	Chromium	22.5	Copper	228	Chromium	31.8	Chromium	20.6	Chromium	16.7	Cadmium	20.6	Calcium	97900	Calcium	120000
		Iron	15300	Copper	151	Iron	18600	Copper	412	Copper	107	Cobalt	2	Calcium	151000	Chromium	14.8	Chromium	31.6
		Lead	51.8	Iron	19400	Lead	84.2	Iron	25900	Iron	23600	Copper	108	Chromium	29	Cobalt	0.88	Cobalt	2.5
		Magnesium	42200	Lead	41.7	Magnesium	507000	Lead	113	Lead	28	Iron	19000	Copper	414	Copper	141	Copper	376
		Manganese	4440	Magnesium	59900	Manganese	3670	Magnesium	52400	Magnesium	65100	Lead	21.9	Iron	23800	Iron	18300	Iron	25600
		Mercury	0.36	Manganese	4940	Mercury	0.99	Manganese	3870	Manganese	5680	Magnesium	47300	Lead	86.8	Lead	27.5	Lead	76.5
		Nickel	10.5	Nickel	12.3	Nickel	9.1	Mercury	0.51	Potassium	32600	Manganese	4440	Magnesium	54400	Magnesium	47700	Magnesium	54700
		Potassium	22100	Potassium	24200*	Potassium	19000	Nickel	12.1	Sodium	564000	Mercury	0.17	Manganese	4870	Manganese	3810	Manganese	4630
		Sodium	348000	Sodium	473000	Sodium	386000	Potassium	20400	Vanadium	7.9	Nickel	11.7	Mercury	0.43	Mercury	0.28	Mercury	0.58
		Vanadium	6	Vanadium	8.06	Zinc	241	Sodium	404000			Potassium	21200	Nickel	22.6	Nickel	13.4	Nickel	18.3
		Zinc	79	Zinc	63.9			Vanadium	16.2			Sodium	374000	Potassium	20500	Potassium	29200	Potassium	31200
								Zinc	216					Sodium	429000	Sodium	325000	Sodium	370000
														Vanadium	12.8	Vanadium	7.4	Vanadium	13.9
														Zinc	195	Zinc	63.9	Zinc	169

TABLE A-7
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATES																	
		Jun-92 1st O&M		Oct-92 2nd O&M		Jan-93 3rd O&M		Apr-93 4th O&M		Aug-93 5th O&M		Nov-93 6th O&M		Apr-94 7th O&M		Jan-95 8th O&M		Apr-95 9th O&M	
MW-10S	Off-Property	Aluminum	2240	Aluminum	3110	Aluminum	1630	Barium	88.9	Aluminum	3610	Aluminum	890	Aluminum	1140	Aluminum	1810	Aluminum	912
		Arsenic	4.8	Antimony	29.2	Arsenic	6.5	Calcium	389000	Antimony	39.7	Arsenic	17.5	Barium	120	Antimony	8.2	Antimony	15.8
		Barium	455	Arsenic	26.2	Barium	90.7	Chromium	21.8	Arsenic	16.8	Barium	637	Beryllium	0.51	Arsenic	6.6	Arsenic	8.6
		Calcium	305000	Barium	766	Calcium	403000	Copper	22	Barium	303	Beryllium	0.48	Calcium	408000	Barium	402	Barium	305
		Chromium	338	Calcium	289000	Chromium	492	Cyanide	5	Beryllium	0.36	Calcium	348000	Chromium	22.7	Cadmium	2.4	Cadmium	2.1
		Iron	1870	Chromium	2390	Copper	20.6	Iron	664	Cadmium	2.8	Chromium	378	Cobalt	3.1	Calcium	343000	Calcium	344000
		Magnesium	130000	Copper	14.7	Cyanide	4.4	Magnesium	96400	Calcium	364000	Cobalt	2.5	Iron	408	Chromium	753	Chromium	1960
		Manganese	1690	Iron	3900	Iron	1330	Manganese	464	Chromium	456	Iron	1110	Magnesium	116000	Cobalt	1.2	Cobalt	3.9
		Nickel	83.6	Lead	29.6	Lead	16.9	Nickel	16.5	Copper	37.2	Lead	6.2	Manganese	529	Copper	18	Copper	25.8
		Potassium	41300	Magnesium	133000	Magnesium	94900	Potassium	32100	Iron	1570	Magnesium	141000	Nickel	39.5	Iron	959	Iron	3640
		Sodium	677000	Manganese	1050	Manganese	936	Sodium	340000	Lead	37.4	Manganese	1270	Potassium	31000	Lead	10.2	Lead	8.1
		Vanadium	14.7	Nickel	546	Nickel	202	Zinc	64.1	Magnesium	133000	Nickel	236	Silver	2.6	Magnesium	118000	Magnesium	132000
				Potassium	41500	Potassium	35500			Manganese	1010	Potassium	48900	Sodium	573000*	Manganese	1020	Manganese	1260
				Sodium	710000	Sodium	274000			Nickel	195	Sodium	731000	Zinc	144	Nickel	102	Nickel	489
				Vanadium	111	Zinc	97.5			Potassium	46000	Vanadium	87.3			Potassium	59000	Potassium	56100
				Zinc	102					Sodium	636000	Zinc	72.7			Sodium	499000	Sodium	521000
										Vanadium	92.9					Vanadium	13.2	Vanadium	17.1
										Zinc	183					Zinc	57.3	Zinc	135
MW-11S	Off-Property	Aluminum	5350	Aluminum	334	Aluminum	832	Aluminum	2660	Aluminum	3790	Aluminum	8970	Aluminum	14800	Aluminum	10400	Aluminum	20200
		Arsenic	6.1	Arsenic	10.2	Barium	82.9	Arsenic	3.4	Barium	143	Arsenic	8.3	Arsenic	5.8	Antimony	13.1	Antimony	2.7
		Barium	151	Barium	103	Calcium	209000	Barium	94.5	Beryllium	0.4	Barium	158	Barium	236	Arsenic	9.6	Arsenic	10.4
		Calcium	227000	Calcium	288000	Copper	40.5	Cadmium	3.8	Calcium	352000	Beryllium	0.92	Beryllium	1.2	Barium	190	Barium	210
		Chromium	23.4	Chromium	4.59	Iron	245	Calcium	183000	Chromium	19.4	Cadmium	2.5	Calcium	318000	Beryllium	0.36	Beryllium	1.6
		Copper	35.4	Cobalt	5.19	Lead	42.3	Chromium	15.2	Copper	19.9	Calcium	312000	Chromium	324	Cadmium	0.81	Cadmium	3.3
		Iron	8200	Iron	953	Magnesium	25700	Cyanide	17.6	Iron	3300	Chromium	53	Cobalt	12.9	Calcium	258000	Calcium	248000
		Lead	23.5	Magnesium	31200	Manganese	3230	Iron	4210	Lead	10.7	Cobalt	10.6	Copper	55.4	Chromium	1900	Chromium	397
		Magnesium	25100	Manganese	4150	Mercury	1.6	Magnesium	18400	Magnesium	34500	Copper	35.5	Iron	21100	Cobalt	7.6	Cobalt	23
		Manganese	4080	Nickel	7.93	Nickel	8.1	Manganese	2490	Manganese	5140	Iron	16400	Lead	93.1	Copper	57.9	Copper	87.8
		Mercury	0.6	Potassium	12200	Potassium	8480	Potassium	7270	Potassium	11800	Lead	64.1	Magnesium	33900	Iron	16900	Iron	21700
		Nickel	7.3	Sodium	87300	Sodium	66300	Sodium	520000	Silver	3	Magnesium	33100	Manganese	4440	Lead	46.5	Lead	127
		Potassium	9690	Vanadium	16.6	Zinc	76.2	Vanadium	13.3	Sodium	75900	Manganese	3960	Mercury	2.3	Magnesium	30700	Magnesium	28300
		Sodium	52000							Vanadium	8.4	Mercury	1.5	Nickel	112	Manganese	3500	Manganese	4540
		Vanadium	14.2									Nickel	47.2	Potassium	10500	Mercury	1.2	Mercury	2.1
												Potassium	10400	Silver	2	Nickel	85.9	Nickel	216
												Sodium	67700	Sodium	102000	Potassium	14200	Potassium	13100
												Vanadium	41.4	Vanadium	41.9	Sodium	82600	Selenium	4.7
												Zinc	100	Zinc	107	Vanadium	39.2	Sodium	83300
																Zinc	100	Vanadium	66.2
																		Zinc	324

TABLE A-7
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATES																	
		Jun-92 1st O&M		Oct-92 2nd O&M		Jan-93 3rd O&M		Apr-93 4th O&M		Aug-93 5th O&M		Nov-93 6th O&M		Apr-94 7th O&M		Jan-95 8th O&M		Apr-95 9th O&M	
MW-12S	Off-Property	Barium	15.5	Aluminum	440	Aluminum	516	Aluminum	8120	Aluminum	40000	Aluminum	1560	Aluminum	5560	Aluminum	4140	Aluminum	32900
		Calcium	38500	Barium	26.6	Calcium	37600	Barium	49.1	Arsenic	3.5	Barium	19.5	Barium	43.5	Barium	47.8	Arsenic	7.2
		Chromium	3.9	Calcium	52400	Iron	840	Calcium	26400	Barium	208	Calcium	28800	Calcium	32500	Calcium	50700	Barium	202
		Copper	8.6	Chromium	3.1	Magnesium	6210	Chromium	33.1	Beryllium	1.2	Chromium	12.1	Chromium	20.5	Chromium	21.9	Beryllium	1.4
		Iron	858	Iron	749	Manganese	131	Cobalt	4.7	Calcium	46200	Copper	11.3	Cobalt	4.3	Cobalt	3.6	Cadmium	3.1
		Lead	7.8	Magnesium	9290	Nickel	5.8	Copper	50.8	Chromium	399	Iron	1810	Copper	34.3	Copper	38.4	Calcium	48100
		Magnesium	6260	Manganese	642	Potassium	4000	Iron	12380	Cobalt	36.2	Lead	5.9	Iron	6850	Iron	7330	Chromium	132
		Manganese	278	Nickel	5.53	Sodium	10200	Lead	38.9	Copper	241	Magnesium	4440	Magnesium	6650	Lead	24.9	Cobalt	23.7
		Mercury	0.21	Potassium	5830	Zinc	53.9	Magnesium	8190	Iron	57900	Manganese	168	Manganese	234	Magnesium	8350	Copper	221
		Nickel	12.5	Sodium	18400			Manganese	224	Lead	122	Nickel	8.5	Mercury	0.3	Manganese	722	Iron	48900
		Potassium	4120	Vanadium	4.42			Mercury	0.66	Magnesium	24700	Potassium	5000	Potassium	3840	Mercury	0.21	Lead	176
		Sodium	17900					Nickel	21.4	Manganese	1770	Sodium	9080	Sodium	16200	Nickel	17.2	Magnesium	17200
		Vanadium	2.4					Potassium	3170	Mercury	2.9			Vanadium	15.6	Potassium	5930	Manganese	915
								Sodium	7860	Nickel	331			Zinc	66.3	Sodium	8860	Mercury	1.9
								Vanadium	23.9	Potassium	7660					Vanadium	13.8	Nickel	109
								Zinc	103	Silver	3					Zinc	62.5	Potassium	6240
										Sodium	13400							Selenium	5.8
										Vanadium	110							Sodium	8530
										Zinc	393							Vanadium	95.1
																		Zinc	611

All units in ug/l.
*analyte was found in the associated blank as well as in the sample
Concentration exceeds Class II-A Groundwater Quality Standards. Class II-A standards are referred to here for comparison purposes only. Class II-A is effectively the most stringent standard and the hydrogeologic setting of the shallow fill is such that less stringent Class III-B standards would likely apply.
Tables Checked by: APJ and BJS

TABLE A-7
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SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATES																					
		Apr-96 13th O&M		Sep-96 14th O&M		Nov-97 19th O&M		Oct-98 23rd O&M		Dec-99 27th O&M		Dec-00 31st O&M		Nov-01 35th O&M		Sep-02 39th O&M		Nov-03 43rd O&M		Nov-04 47th O&M	
MW-8S	Off-Property	Aluminum	4510	Aluminum	146*	Aluminum	350	Aluminum	117*	Aluminum	26700	Aluminum	4920	Aluminum	5630	Aluminum	2300	Aluminum	11700	Aluminum	2430
		Arsenic	20.1	Arsenic	19.8	Antimony	3.8*	Arsenic	44.7	Arsenic	86.9	Arsenic	43.4	Arsenic	46.9	Arsenic	32.5	Antimony	8.5*	Arsenic	31.8
		Barium	399	Barium	504	Arsenic	22.3	Barium	585	Barium	1060	Barium	431	Barium	419	Barium	468	Arsenic	71.3	Barium	292
		Beryllium	0.74*	Cadmium	0.77*	Barium	505	Cadmium	2.2*	Beryllium	0.85*	Beryllium	0.26*	Cadmium	2.3	Cadmium	0.82*	Barium	910	Beryllium	1.1*
		Cadmium	2.4*	Calcium	154000	Beryllium	0.58*	Calcium	135000	Cadmium	12.7	Cadmium	1.8*	Calcium	121000	Calcium	129000	Beryllium	0.36*	Cadmium	0.65*
		Calcium	129000	Chromium	7.6*	Calcium	141000	Cobalt	3.2*	Calcium	163000	Calcium	130000	Chromium	68.6	Chromium	79.5	Cadmium	3.8*	Calcium	102000
		Chromium	42.1	Cobalt	1.7*	Chromium	8.4*	Copper	17.5*	Chromium	189	Chromium	73.5	Cobalt	3.5	Cobalt	1.1*	Calcium	122000	Chromium	21.7
		Cobalt	2.1*	Copper	7.5*	Cobalt	2.3*	Iron	27200	Cobalt	6.7*	Cobalt	3.1*	Copper	191	Copper	199	Chromium	208	Cobalt	1.3*
		Copper	91.1	Iron	18500	Copper	23.2*	Lead	2.9*	Copper	509	Copper	180	Iron	17900	Iron	23600	Cobalt	4.9*	Copper	568
		Cyanide	10	Lead	8.4	Iron	22900	Magnesium	40400	Iron	167000	Iron	29600	Lead	34.8	Lead	21.7	Copper	3010	Iron	17000
		Iron	19000	Magnesium	45700	Lead	8.4	Manganese	4020	Lead	108	Lead	26.6	Magnesium	52000	Magnesium	56900	Iron	123000	Lead	27.7
		Lead	22.5	Manganese	4650	Magnesium	38400	Nickel	68.7	Magnesium	54100	Magnesium	48000	Manganese	2960	Manganese	3280	Lead	253	Magnesium	41100
		Magnesium	50000	Nickel	15.5*	Manganese	4180	Potassium	23700	Manganese	5080	Manganese	3360	Mercury	0.3	Nickel	26.7*	Magnesium	56000	Manganese	2390
		Manganese	3570	Potassium	23800	Nickel	10.5*	Selenium	4*	Mercury	0.65	Mercury	0.31	Nickel	39.5	Potassium	41700	Manganese	3600	Nickel	20.7*
		Nickel	34.6*	Sodium	240000	Potassium	19100	Silver	7.5*	Nickel	111	Nickel	36.4*	Potassium	38200	Selenium	2.4	Mercury	0.3	Potassium	26200
		Potassium	24100	Vanadium	1.3*	Sodium	204000	Sodium	238000	Potassium	34400	Potassium	32000	Sodium	344000	Sodium	496000	Nickel	106	Sodium	303000
		Sodium	258000	Zinc	19.1	Vanadium	3.2*	Thallium	4.9*	Silver	0.93*	Sodium	304000	Vanadium	18.7	Vanadium	9*	Potassium	33900	Vanadium	12
		Vanadium	10.5*			Zinc	53.3	Vanadium	2.9*	Sodium	330000	Thallium	12.1	Zinc	121	Zinc	150	Selenium	3.4*	Zinc	192
		Zinc	66.8					Zinc	30.4	Vanadium	61.9	Vanadium	13.8*					Silver	1.6*		
										Zinc	679	Zinc	147					Sodium	379000		
																		Vanadium	40.2*		
																		Zinc	1510		
MW-9S	Off-Property	Aluminum	1940	Aluminum	140*	Aluminum	260	Aluminum	75.7*	Aluminum	683	Aluminum	469	Aluminum	1200	Aluminum	1530	Aluminum	721	Aluminum	451
		Barium	552	Arsenic	5.1*	Barium	486	Arsenic	4.2*	Barium	442	Arsenic	22.4	Arsenic	13.7	Antimony	2.4*	Arsenic	6.9*	Antimony	3.6*
		Beryllium	0.57*	Barium	752	Beryllium	0.54*	Barium	442	Cadmium	1.7*	Barium	346	Barium	660	Arsenic	18.5	Barium	519	Arsenic	19
		Cadmium	4.8*	Cadmium	1.3*	Calcium	114000	Cadmium	1.8*	Calcium	100000	Beryllium	0.21*	Cadmium	6.5	Barium	558	Cadmium	1.6*	Barium	455
		Calcium	126000	Calcium	140000	Chromium	38.9	Calcium	102000	Chromium	8.7*	Cadmium	1.8*	Calcium	137000	Cadmium	4.1*	Calcium	120000	Beryllium	1*
		Chromium	20.6	Chromium	11.9	Cobalt	4.1*	Cobalt	0.95*	Copper	84.8	Calcium	93800	Chromium	16.2	Calcium	122000	Chromium	8.2*	Cadmium	1.5*
		Copper	189	Copper	4.3*	Copper	7.8*	Copper	7.7*	Iron	25400	Chromium	8	Copper	180	Chromium	18.5	Copper	118	Calcium	121000
		Cyanide	10	Iron	25400	Iron	28500	Iron	25000	Lead	12.4	Cobalt	0.7*	Iron	21200	Cobalt	0.64*	Iron	28300	Chromium	7.9*
		Iron	24500	Magnesium	62300	Lead	5.9	Lead	2.5*	Magnesium	34500	Copper	54.9	Lead	30.9	Copper	206	Lead	20.1	Copper	104
		Lead	38.5	Manganese	5500	Magnesium	53800	Magnesium	45100	Manganese	4500	Iron	19000	Magnesium	47700	Iron	24800	Magnesium	37800	Iron	25800
		Magnesium	55800	Nickel	4.7*	Manganese	4720	Manganese	4340	Mercury	0.19*	Lead	9.9	Manganese	5330	Lead	43.7	Manganese	5020	Lead	9.4
		Manganese	4930	Potassium	43200	Nickel	24.9*	Nickel	4.6*	Nickel	5.1*	Magnesium	34800	Mercury	0.23	Magnesium	37900	Nickel	5.4*	Magnesium	34800
		Mercury	0.29	Sodium	449000	Potassium	30700	Potassium	29500	Potassium	21700	Manganese	3920	Nickel	13.7	Manganese	4750	Potassium	19200	Manganese	4940
		Nickel	14.3*	Thallium	3.3*	Sodium	381000	Selenium	4.4*	Sodium	231000	Mercury	0.15*	Potassium	30000	Mercury	0.25	Silver	0.7*	Nickel	12.9*
		Potassium	31400	Vanadium	3.4*	Vanadium	3.5*	Sodium	352000	Vanadium	4.5*	Nickel	13.8*	Sodium	350000	Nickel	12.8*	Sodium	252000	Potassium	15600
		Sodium	379000	Zinc	13.9	Zinc	44.1	Thallium	3.4*	Zinc	61.4	Potassium	22000	Vanadium	8	Potassium	29200	Vanadium	4.6*	Sodium	229000
		Vanadium	6.7*					Vanadium	3.4*			Selenium	5.2	Zinc	111	Selenium	4.5	Zinc	79.2	Vanadium	4.2
		Zinc	190					Zinc	10.8*			Silver	0.52*			Silver	0.99*			Zinc	93.6
												Sodium	257000			Sodium	314000				
												Thallium	9.2*			Vanadium	7.9*				
												Vanadium	5.6*			Zinc	109				
												Zinc	42.2								

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METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATES																	
		Apr-96 13th O&M		Sep-96 14th O&M		Nov-97 19th O&M		Oct-98 23rd O&M		Dec-99 27th O&M		Dec-00 31st O&M		Nov-01 35th O&M		Sep-02 39th O&M		Nov-03 43rd O&M		Nov-04 47th O&M	
MW-10S	Off-Property	Aluminum	427	Aluminum	214	Aluminum	241	Aluminum	62*	Aluminum	1270	Aluminum	544	Aluminum	273	Aluminum	94.4*	Aluminum	117*	Antimony	4.8*
		Barium	112*	Arsenic	2.5*	Barium	711	Arsenic	2.5*	Arsenic	11.9	Arsenic	12.7	Antimony	11.4	Antimony	4.6*	Antimony	5.2*	Arsenic	11.8
		Beryllium	0.56*	Barium	623	Beryllium	0.63*	Barium	792	Barium	522	Barium	504	Arsenic	21.3	Arsenic	12.4	Arsenic	6.5*	Barium	354
		Calcium	321000	Cadmium	0.46*	Calcium	235000	Cadmium	2.3*	Cadmium	1.3*	Cadmium	0.42*	Barium	434	Barium	420	Barium	347	Beryllium	0.9*
		Chromium	28.6	Calcium	356000	Chromium	26.4	Calcium	213000	Calcium	195000	Calcium	194000	Calcium	192000	Calcium	129000	Cadmium	0.25*	Calcium	200000
		Cobalt	1.6*	Chromium	13.9	Cobalt	1*	Cobalt	1.9*	Chromium	2820	Chromium	401	Chromium	667	Chromium	11.4	Calcium	265000	Chromium	112
		Copper	23.9*	Cobalt	1.7*	Copper	6.1*	Copper	8.5*	Cobalt	6.3*	Cobalt	2.1*	Cobalt	2.6	Copper	8.2*	Chromium	280	Cobalt	1.2*
		Cyanide	10	Copper	8.6*	Iron	2620	Iron	3160	Copper	94.4	Copper	23.2*	Copper	25.5	Iron	2860	Cobalt	2.4*	Copper	19.3*
		Iron	1260	Iron	3380	Lead	19.7	Lead	1.2*	Iron	4500	Iron	2140	Iron	3720	Lead	1.1	Copper	24.9*	Iron	445
		Lead	5.1	Lead	1.7*	Magnesium	95700	Magnesium	80600	Lead	33.3	Lead	5.2	Lead	5.8	Magnesium	45100	Iron	2500	Lead	4.8
		Magnesium	94300	Magnesium	143000	Manganese	1470	Manganese	1510	Magnesium	67000	Magnesium	69900	Magnesium	62800	Manganese	1040	Lead	10.8	Magnesium	67700
		Manganese	660	Manganese	1650	Nickel	7.7*	Nickel	8.1*	Manganese	821	Manganese	1080	Manganese	1080	Nickel	8.6	Magnesium	75500	Manganese	718
		Nickel	19.1*	Nickel	15.8*	Potassium	66300	Potassium	66700	Mercury	0.43	Mercury	0.16*	Nickel	203	Potassium	38500	Manganese	842	Nickel	34.1*
		Potassium	47300	Potassium	81800	Sodium	741000	Selenium	3.4*	Nickel	419	Nickel	91.1	Potassium	49000	Sodium	333000	Nickel	46.2	Potassium	36800
		Sodium	380000	Sodium	750000	Vanadium	2.7*	Sodium	698000	Potassium	49300	Potassium	54500	Sodium	474000	Vanadium	10.6	Potassium	39600	Sodium	378000
		Vanadium	1.9*	Vanadium	2.2*	Zinc	28.5	Thallium	4.2*	Sodium	466000	Sodium	491000	Vanadium	32.9	Zinc	4.5*	Sodium	305000	Vanadium	24
		Zinc	109	Zinc	24.9			Vanadium	3*	Vanadium	49.1*	Vanadium	15.3*	Zinc	45.1			Vanadium	17*	Zinc	33.9
								Zinc	6.8*	Zinc	157	Zinc	57.2					Zinc	45.1		
MW-11S	Off-Property	Aluminum	4560	Aluminum	235	Aluminum	176*	Aluminum	141*	Aluminum	3090	Aluminum	6570	Aluminum	2950	Aluminum	1310	Aluminum	35100	Aluminum	5920
		Barium	74.1*	Arsenic	6*	Barium	118*	Barium	132*	Antimony	4.1*	Antimony	4.3*	Arsenic	5.9	Arsenic	8.1*	Arsenic	65.9	Antimony	15.6*
		Calcium	86300	Barium	139*	Beryllium	0.59*	Beryllium	0.25*	Arsenic	9.7*	Arsenic	17	Barium	281	Barium	200*	Barium	432	Arsenic	19.9
		Chromium	141	Cadmium	0.74*	Calcium	168000	Cadmium	1.2*	Barium	102*	Barium	146*	Cadmium	0.55	Calcium	153000	Beryllium	2.1*	Barium	133*
		Cobalt	3.8*	Calcium	265000	Chromium	12.6	Calcium	106000	Beryllium	0.22*	Beryllium	0.47*	Calcium	186000	Chromium	2140	Cadmium	3.2*	Beryllium	1.1*
		Copper	27.3	Chromium	10.3	Cobalt	2.2*	Chromium	50.8	Calcium	96500	Cadmium	0.75*	Chromium	713	Cobalt	4.4*	Calcium	82100	Cadmium	0.5*
		Cyanide	10	Cobalt	3.5*	Copper	8.6*	Cobalt	2.6*	Chromium	159	Calcium	87900	Cobalt	5.4	Copper	35.7	Chromium	11200	Calcium	89700
		Iron	6510	Copper	10*	Iron	11300	Copper	8.2*	Cobalt	3.1*	Chromium	306	Copper	45.1	Iron	10300	Cobalt	26.8*	Chromium	851
		Lead	22.6	Iron	14500	Lead	4.6	Iron	2860	Copper	35.6	Cobalt	5.8*	Iron	8620	Lead	10.3	Copper	525	Cobalt	3.9*
		Magnesium	10900	Lead	4.8	Magnesium	23300	Lead	3.5	Iron	6060	Copper	58.2	Lead	22.9	Magnesium	18300	Iron	79200	Copper	68.1
		Manganese	585	Magnesium	30100	Manganese	911	Magnesium	12600	Lead	27.8	Iron	12600	Magnesium	23000	Manganese	1200	Lead	228	Iron	7740
		Mercury	0.37	Manganese	5810	Nickel	5.6*	Manganese	880	Magnesium	12600	Lead	48.7	Manganese	1700	Mercury	0.15*	Magnesium	15100	Lead	34.6
		Nickel	34.2*	Nickel	19.5*	Potassium	16300	Nickel	34.2*	Manganese	354	Magnesium	12100	Mercury	0.38	Nickel	320	Manganese	988	Magnesium	11900
		Potassium	6960	Potassium	15200	Sodium	56800	Potassium	8650	Mercury	0.36	Manganese	356	Nickel	399	Potassium	15300	Mercury	3.6	Manganese	224
		Sodium	30400	Sodium	84700	Vanadium	3.4*	Sodium	27800	Nickel	24.2*	Mercury	0.86	Potassium	17200	Selenium	7.4	Nickel	976	Mercury	0.47
		Vanadium	13.9*	Vanadium	2.7*	Zinc	14.4*	Vanadium	1.8*	Potassium	5780	Nickel	70	Sodium	394000	Sodium	380000	Potassium	7470	Nickel	94.9
		Zinc	73.5					Zinc	38.1	Sodium	28600	Potassium	6390	Vanadium	12.7	Vanadium	16.8*	Selenium	2.8*	Potassium	4670*
										Vanadium	15*	Sodium	35500	Zinc	59.6	Zinc	53.1	Silver	1.2*	Sodium	39400
										Zinc	59.1	Thallium	13.9					Sodium	82900	Vanadium	25.5*
												Vanadium	31.4*					Thallium	1.7*	Zinc	90.1
												Zinc	111					Vanadium	168		
																		Zinc	532		

TABLE A-7
216 PATERSON PLANK ROAD SITE
SUMMARY OF GROUNDWATER QUALITY DATA
SHALLOW FILL MONITORING WELLS
METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMPLING DATES																					
		Apr-96 13th O&M		Sep-96 14th O&M		Nov-97 19th O&M		Oct-98 23rd O&M		Dec-99 27th O&M		Dec-00 31st O&M		Nov-01 35th O&M		Sep-02 39th O&M		Nov-03 43rd O&M		Nov-04 47th O&M	
MW-12S	Off-Property	Aluminum	5140	Aluminum	118*	Aluminum	169*	Aluminum	70.8*	Aluminum	8380	Aluminum	6810	Aluminum	21000	Aluminum	919	Aluminum	5660	Aluminum	1110
		Barium	56*	Barium	33*	Barium	40.4*	Arsenic	1.9*	Barium	77*	Arsenic	3.5*	Barium	167	Arsenic	1.4*	Barium	76.1*	Antimony	3.7*
		Beryllium	0.68*	Calcium	49700	Beryllium	0.57*	Barium	51.8*	Calcium	63200	Barium	72.8*	Cadmium	2	Barium	36.2*	Cadmium	0.26*	Barium	26.3*
		Calcium	55500	Cobalt	0.68*	Calcium	54300	Beryllium	0.21*	Chromium	45	Beryllium	0.24*	Calcium	78600	Calcium	62700	Calcium	57500	Beryllium	0.73*
		Chromium	43.7	Copper	11.8*	Cobalt	0.95*	Calcium	77000	Cobalt	6.2*	Cadmium	0.39*	Chromium	171	Chromium	9.6*	Chromium	47.6	Calcium	52500
		Cobalt	3.6*	Iron	105	Copper	7.5*	Chromium	4.2*	Copper	89.9	Calcium	55800	Cobalt	17.4	Cobalt	0.98*	Cobalt	3.8*	Chromium	15.8
		Copper	46.2	Lead	1.5*	Iron	467	Cobalt	0.86*	Iron	10300	Chromium	38.3	Copper	246	Copper	13.5*	Copper	63.4	Cobalt	0.83*
		Iron	6850	Magnesium	7270	Lead	4.2	Copper	10.3*	Lead	37.6	Cobalt	5.5*	Iron	27000	Iron	1180	Iron	6610	Copper	24.6*
		Lead	28.6	Manganese	74.3	Magnesium	8720	Lead	2.2*	Magnesium	14400	Copper	80.2	Lead	86.6	Lead	4.7	Lead	21.5	Iron	1260
		Magnesium	10100	Nickel	11.1*	Manganese	327	Magnesium	12600	Manganese	120	Iron	8630	Magnesium	22100	Magnesium	11000	Magnesium	11400	Lead	5.4
		Manganese	247	Potassium	4070	Potassium	4450*	Manganese	162	Mercury	0.89	Lead	29	Manganese	469	Manganese	104	Manganese	115	Magnesium	8430
		Mercury	0.4	Sodium	9200	Sodium	6580	Nickel	9*	Nickel	25.7*	Magnesium	12100	Mercury	1.3	Nickel	9.2*	Mercury	0.5	Manganese	21.9
		Nickel	29.5*	Vanadium	3.1*	Vanadium	2.8*	Potassium	4960	Potassium	4170*	Manganese	228	Nickel	148	Potassium	2050*	Nickel	35.7*	Nickel	8.6*
		Potassium	3500*			Zinc	13*	Sodium	13000	Sodium	10800	Mercury	0.58	Potassium	3740	Sodium	9460	Potassium	2260*	Potassium	1130*
		Sodium	11000					Vanadium	1.5*	Vanadium	19*	Nickel	22.1*	Sodium	13500	Vanadium	4.7*	Sodium	6240	Sodium	4010*
		Vanadium	13.1*					Zinc	27.2	Zinc	145	Potassium	3420	Vanadium	48.2	Zinc	10.3*	Vanadium	16*	Vanadium	5.7
		Zinc	95									Selenium	4.8	Zinc	332			Zinc	83.3	Zinc	30.5
												Sodium	9920								
												Thallium	6*								
												Vanadium	17.5*								
												Zinc	114								

TABLE A-8
216 PATERSON PLANK ROAD SITE
SUMMARY OF SURFACE WATER QUALITY DATA
METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMLING DATE																	
		Jul-87 Pre-IRM		Dec-87 Pre-IRM		Jun-92 1st O&M		Oct-92 2nd O&M		Jan-93 3rd O&M		Apr-93 4th O&M		Aug-93 5th O&M		Nov-93 6th O&M		Apr-94 7th O&M		Jan-95 8th O&M	
SW-01	Off-Property	Zinc	39	Copper	16	Arsenic	3.8	Aluminum	161	Calcium	58700	Aluminum	588	Aluminum	1320	Aluminum	376	Aluminum	1240	Arsenic	3.6
				Mercury	63	Barium	27.2	Arsenic	1.85	Iron	474	Barium	36.4	Arsenic	4.4	Barium	41.1	Arsenic	3.8	Barium	39.7
						Calcium	34500	Barium	54.1	Magnesium	77400	Calcium	24400	Barium	96.6	Beryllium	0.14	Barium	59.8	Calcium	71600
						Chromium	14.4	Calcium	114000	Manganese	510	Chromium	17.5	Beryllium	0.64	Calcium	56000	Calcium	45400	Chromium	7
						Copper	9.7	Chromium	6.82	Nickel	5.2	Copper	14.1	Calcium	176000	Chromium	7.8	Silver	2.2	Cobalt	0.69
						Iron	1320	Cyanide	24.6	Potassium	25900	Iron	1850	Chromium	10	Copper	9.5	Chromium	36.7	Copper	7.5
						Lead	14.9	Iron	694	Sodium	660000	Magnesium	9480	Copper	16.1	Iron	866	Sodium	117000	Iron	618
						Magnesium	33500	Lead	2.03	Zinc	56.2	Manganese	398	Cyanide	14.7	Lead	3.1	Copper	23.5	Lead	6.8
						Manganese	650	Magnesium	221000			Mercury	1.7	Iron	898	Magnesium	91600	Iron	3310	Magnesium	130000
						Mercury	2.6	Manganese	513			Potassium	4030	Magnesium	437000	Manganese	644	Magnesium	15700	Manganese	390
						Nickel	6.9	Potassium	69600			Sodium	75100	Manganese	818	Mercury	0.67	Manganese	665	Mercury	0.29
						Potassium	13100	Selenium	2.05			Zinc	72	Potassium	135000	Nickel	10	Mercury	3.5	Nickel	9
						Sodium	299000	Silver	2.46					Sodium	3610000	Potassium	30000	Potassium	6040	Potassium	78300
						Vanadium	4	Sodium	1960000					Vanadium	3.6	Sodium	853000	Zinc	87.3	Sodium	1000000
						Zinc	75.2	Vanadium	3.02							Zinc	63.5			Vanadium	2.3
								Zinc	37.2											Zinc	32.8
SW-02	Off-Property	Zinc	63	Chromium	28	Arsenic	4.1	Aluminum	154	Aluminum	139	Aluminum	691	Aluminum	1400	Aluminum	417	Aluminum	691	Barium	54.2
				Zinc	90	Barium	26.6	Arsenic	2.04	Calcium	58800	Arsenic	2.9	Arsenic	5.5	Barium	44.4	Arsenic	2.9	Calcium	72900
						Calcium	39900	Barium	62.6	Iron	814	Barium	68.7	Barium	114	Calcium	54700	Barium	68.7	Chromium	9.9
						Chromium	10.2	Beryllium	1.03	Magnesium	47500	Calcium	73000	Beryllium	0.54	Chromium	9.5	Calcium	73000	Copper	10.4
						Copper	20.3	Calcium	112000	Manganese	953	Silver	2.1	Calcium	173000	Copper	11.1	Silver	2.1	Iron	874
						Iron	1580	Chromium	10.6	Mercury	0.8	Chromium	16.5	Chromium	15.1	Iron	996	Chromium	16.5	Lead	4.9
						Lead	14.2	Cyanide	12.4	Nickel	24.4	Sodium	83800	Copper	20.6	Lead	2.9	Sodium	83800	Magnesium	88600
						Magnesium	13000	Iron	772	Potassium	15500	Copper	24.8	Iron	1350	Magnesium	78400	Copper	24.8	Manganese	742
						Manganese	466	Lead	2.83	Sodium	388000	Iron	3000	Magnesium	389000	Manganese	760	Iron	3000	Mercury	0.56
						Mercury	2	Magnesium	214000	Zinc	130	Magnesium	17600	Manganese	1110	Mercury	0.79	Magnesium	17600	Nickel	14.7
						Nickel	11.7	Manganese	667			Manganese	636	Mercury	1.2	Nickel	19.1	Manganese	636	Potassium	52500
						Potassium	4000	Nickel	4.74			Mercury	1.5	Potassium	120000	Potassium	25400	Mercury	1.5	Sodium	653000
						Sodium	69200	Potassium	66400			Nickel	22.8	Sodium	3170000	Sodium	719000	Nickel	22.8	Vanadium	2
						Vanadium	3.4	Silver	2.78			Vanadium	9.6	Vanadium	5	Zinc	103	Vanadium	9.6	Zinc	53.2
						Zinc	51.1	Sodium	1820000			Potassium	5640					Potassium	5640		
								Thallium	3.5			Zinc	54.1					Zinc	54.1		
								Vanadium	2.31												
								Zinc	52.7												

TABLE A-8
216 PATERSON PLANK ROAD SITE
SUMMARY OF SURFACE WATER QUALITY DATA
METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMLING DATE																	
		Jul-87 Pre-IRM		Dec-87 Pre-IRM		Jun-92 1st O&M		Oct-92 2nd O&M		Jan-93 3rd O&M		Apr-93 4th O&M		Aug-93 5th O&M		Nov-93 6th O&M		Apr-94 7th O&M		Jan-95 8th O&M	
SW-03	Off-Property	Nickel	11	Copper	13	Arsenic	4.4	Aluminum	153	Aluminum	150	Aluminum	873	Aluminum	1670	Aluminum	770	Aluminum	406	Aluminum	66.8
		Zinc	150	Nickel	35	Barium	21	Arsenic	2.22	Barium	77.5	Barium	47.4	Arsenic	5.2	Barium	55.7	Arsenic	2.6	Barium	50
				Zinc	82	Calcium	28600	Barium	59.1	Cadmium	6.9	Cadmium	3.5	Barium	127	Cadmium	1.8	Barium	66.1	Calcium	61100
						Chromium	8.2	Calcium	91400	Calcium	82600	Calcium	36800	Beryllium	0.56	Calcium	51900	Calcium	72500	Chromium	8.1
						Copper	14.7	Chromium	7.38	Iron	857	Chromium	18.8	Calcium	170000	Chromium	18.1	Chromium	9.4	Copper	9.7
						Iron	1540	Iron	922	Magnesium	30400	Copper	45.2	Chromium	20.2	Cobalt	2.2	Sodium	83000	Iron	796
						Lead	6.8	Lead	7.07	Manganese	1640	Iron	2870	Copper	32.8	Copper	34	Iron	2770	Lead	3.8
						Magnesium	10000	Magnesium	136000	Mercury	0.53	Magnesium	9760	Iron	1820	Iron	1930	Magnesium	17300	Magnesium	65200
						Manganese	509	Manganese	632	Nickel	180	Manganese	598	Lead	12.8	Lead	14	Manganese	625	Manganese	720
						Mercury	1.2	Nickel	5.57	Potassium	7380	Mercury	2.7	Magnesium	372000	Magnesium	21100	Mercury	0.82	Mercury	0.68
						Nickel	12.3	Potassium	40900	Sodium	189000	Nickel	21.9	Manganese	1200	Manganese	683	Nickel	22.4	Nickel	13.2
						Potassium	3770	Sodium	1050000	Zinc	351	Potassium	3590	Mercury	2.1	Mercury	1.6	Potassium	5370	Potassium	37400
						Sodium	58000	Zinc	38.1			Sodium	50900	Potassium	112000	Nickel	39.5	Zinc	30.1	Sodium	469000
						Vanadium	4					Zinc	78.7	Sodium	3050000	Potassium	7180			Vanadium	2.2
						Zinc	29.1									Sodium	132000			Zinc	51.8
																Zinc	197				
SW-04	Off-Property	Nickel	11	Copper	13	Arsenic	5.1	Aluminum	125	Aluminum	342	Aluminum	862	Aluminum	1260	Aluminum	518	Aluminum	492	Aluminum	193
		Zinc	94	Nickel	49	Barium	20.1	Arsenic	3.15	Barium	98.4	Barium	44.9	Arsenic	8.4	Barium	54.4	Arsenic	3.3	Barium	73.1
				Zinc	130	Calcium	27000	Barium	56.7	Cadmium	16.7	Calcium	26300	Barium	133	Cadmium	1.8	Barium	62.8	Cadmium	0.55
						Chromium	7.2	Calcium	81600	Calcium	72400	Chromium	22.7	Beryllium	0.43	Calcium	42100	Calcium	53900	Calcium	74800
						Copper	7.4	Chromium	12	Copper	18	Copper	41.3	Calcium	176000	Chromium	16.8	Chromium	17.9	Chromium	13.2
						Iron	1580	Iron	1200	Iron	1280	Iron	2960	Chromium	11.8	Cobalt	1.9	Sodium	85900	Cobalt	1
						Lead	4.9	Lead	5.37	Magnesium	34100	Magnesium	8440	Copper	32.6	Copper	29.4	Iron	3660	Copper	16.3
						Magnesium	9670	Magnesium	85700	Manganese	2350	Manganese	703	Iron	1020	Iron	1780	Magnesium	14300	Iron	1350
						Manganese	500	Manganese	610	Mercury	1.2	Mercury	4.1	Magnesium	251000	Lead	4.8	Manganese	644	Lead	3
						Mercury	1.3	Nickel	11.2	Nickel	283	Nickel	30.3	Manganese	1010	Magnesium	23400	Mercury	1.3	Magnesium	26700
						Nickel	9.8	Potassium	25000	Potassium	9820	Potassium	4050	Mercury	1.2	Manganese	1070	Nickel	28.4	Manganese	792
						Potassium	3660	Sodium	688000	Sodium	258000	Sodium	60500	Potassium	68400	Mercury	1.2	Vanadium	10.4	Mercury	0.82
						Sodium	58200	Vanadium	3.54	Zinc	560	Zinc	81.8	Sodium	1980000	Nickel	81.9	Potassium	6030	Nickel	33.2
						Vanadium	3.7	Zinc	43.9					Vanadium	6.4	Potassium	8520	Zinc	42.2	Potassium	12700
																Sodium	182000			Sodium	141000
																Zinc	316			Vanadium	2.6
																				Zinc	52.9

*analyte was found in the associated blank as well as in the sample
Concentration exceeds Class SE surface water quality standard.
Tables Checked by: APJ and BJS

TABLE A-8
216 PATERSON PLANK ROAD SITE
SUMMARY OF SURFACE WATER QUALITY DATA
METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMLING DATE																					
		Apr-95 9th O&M		Apr-96 13th O&M		Nov-97 19th O&M		Oct-98 23rd O&M		Dec-99 27th O&M		Dec-00 31st O&M		Nov-01 35th O&M		Sep-02 39th O&M		Nov-03 43rd O&M		Nov-04 47th O&M	
SW-01	Off-Property	PARAMETER	Result	Aluminum	676.00	Aluminum	323.00	Aluminum	359.00	Aluminum	442.00	Aluminum	167.00 *	Aluminum	173.00	Aluminum	260.00	Aluminum	325.00	Aluminum	840.00
		Aluminum	471	Barium	33.60 *	Barium	51.40 *	Arsenic	4.40 *	Barium	49.30 *	Arsenic	4.20 *	Barium	73.10	Arsenic	4.90 *	Arsenic	1.60 *	Barium	63.90 *
		Antimony	3.2	Beryllium	0.39 *	Calcium	58700.00	Barium	92.20 *	Cadmium	0.53 *	Barium	58.30 *	Calcium	158000.00	Barium	84.50 *	Barium	67.80	Beryllium	0.37 *
		Arsenic	5.2	Calcium	31300.00	Chromium	7.60 *	Cadmium	1.80 *	Calcium	39100.00	Cadmium	0.62 *	Chromium	4.00	Calcium	109000.00	Cadmium	0.27 *	Cadmium	0.42 *
		Barium	75.5	Chromium	9.10 *	Cobalt	0.78 *	Calcium	126000.00	Chromium	16.60	Calcium	98000.00	Copper	5.20	Chromium	9.90 *	Calcium	50300.00	Calcium	68900.00
		Cadmium	0.74	Copper	11.90 *	Copper	7.70 *	Chromium	12.80	Cobalt	0.75 *	Chromium	6.40 *	Iron	342.00	Cobalt	2.00 *	Chromium	8.40 *	Chromium	18.40
		Calcium	94700	Cyanide	20.00	Iron	740.00	Cobalt	1.10 *	Copper	14.80 *	Cobalt	0.96 *	Magnesium	434000.00	Copper	7.90 *	Copper	6.40 *	Cobalt	0.79 *
		Chromium	31.2	Iron	1040.00	Lead	3.50	Copper	7.00 *	Iron	1710.00	Copper	4.60 *	Manganese	525.00	Iron	814.00	Iron	842.00	Copper	12.20 *
		Cobalt	1.4	Lead	7.10	Magnesium	102000.00	Iron	842.00	Lead	8.50	Iron	367.00	Mercury	0.15	Lead	3.80	Lead	4.00	Iron	1980.00
		Copper	16.4	Magnesium	24600.00	Manganese	748.00	Lead	6.00	Magnesium	32100.00	Magnesium	198000.00	Nickel	6.50	Magnesium	262000.00	Magnesium	63200.00	Lead	8.90
		Iron	2030	Manganese	250.00	Mercury	0.62	Magnesium	271000.00	Manganese	582.00	Manganese	779.00	Potassium	227000.00	Manganese	795.00	Manganese	415.00	Magnesiun	108000.00
		Lead	13.4	Mercury	0.46	Nickel	9.50 *	Manganese	1260.00	Mercury	1.70	Mercury	0.32	Sodium	3010000.00	Mercury	0.46	Mercury	0.90	Manganes	420.00
		Magnesium	169000	Nickel	6.70 *	Potassium	55100.00	Mercury	1.50	Nickel	10.90 *	Nickel	8.60 *	Vanadium	1.60	Nickel	6.50 *	Nickel	3.90 *	Mercury	1.80
		Manganese	715	Potassium	20500.00	Sodium	785000.00	Nickel	10.40 *	Potassium	15000.00	Potassium	114000.00	Zinc	28.90	Potassium	152000.00	Potassium	29400.00	Nickel	4.60 *
		Mercury	2.9	Sodium	1020000.00	Vanadium	2.80 *	Potassium	156000.00	Sodium	232000.00	Sodium	1500000.00			Silver	1.20 *	Sodium	430000.00	Potassium	45400.00
		Nickel	13.1	Vanadium	3.30 *	Zinc	48.20	Sodium	2070000.00	Vanadium	2.70 *	Vanadium	2.50 *			Sodium	2000000.00	Vanadium	2.70 *	Sodium	904000.00
		Potassium	98500	Zinc	64.00			Vanadium	2.60 *	Zinc	101.00	Zinc	31.70			Thallium	3.10	Zinc	28.90	Vanadium	3.30 *
		Sodium	1260000					Zinc	42.00							Vanadium	5.40 *			Zinc	59.80
		Vanadium	5.4													Zinc	22.20				
		Zinc	136																		
SW-02	Off-Property	Aluminum	340	Aluminum	534.00	Aluminum	339.00	Aluminum	168.00 *	Aluminum	366.00	Aluminum	165.00 *	Aluminum	194.00	Aluminum	208.00	Aluminum	221.00	Aluminum	283.00
		Antimony	11.9	Barium	51.30 *	Barium	56.40 *	Arsenic	3.60 *	Barium	60.00 *	Barium	58.40 *	Arsenic	3.30	Antimony	1.90 *	Arsenic	2.30 *	Barium	56.40 *
		Barium	76.5	Beryllium	0.37 *	Beryllium	0.14 *	Barium	75.70 *	Cadmium	1.90 *	Cadmium	0.44 *	Barium	81.70	Arsenic	3.50 *	Barium	70.10	Beryllium	0.32 *
		Cadmium	0.65	Calcium	37100.00	Calcium	56500.00	Beryllium	0.26 *	Calcium	43000.00	Calcium	81600.00	Cadmium	0.50	Barium	84.70 *	Calcium	52900.00	Calcium	66500.00
		Calcium	84800	Chromium	11.30	Chromium	8.20 *	Cadmium	1.50 *	Chromium	20.30	Chromium	7.40 *	Calcium	150000.00	Cadmium	0.21 *	Chromium	6.40 *	Chromium	7.50 *
		Chromium	17.1	Copper	22.60 *	Cobalt	1.60 *	Calcium	108000.00	Cobalt	2.20 *	Cobalt	0.79 *	Chromium	4.50	Calcium	117000.00	Copper	4.70 *	Copper	7.20 *
		Cobalt	1.4	Cyanide	20.00	Copper	9.00 *	Chromium	6.70 *	Copper	26.30	Copper	5.60 *	Copper	5.40	Chromium	7.30 *	Iron	1080.00	Iron	769.00
		Copper	23.6	Iron	1410.00	Iron	895.00	Cobalt	0.85 *	Iron	2260.00	Iron	489.00	Iron	406.00	Copper	4.90 *	Lead	3.00	Lead	4.70
		Iron	2270	Lead	5.60	Lead	4.60	Copper	5.60 *	Lead	5.50	Magnesium	146000.00	Magnesium	401000.00	Iron	773.00	Magnesium	63300.00	Magnesiun	88600.00
		Lead	9.8	Magnesium	13400.00	Magnesium	89600.00	Iron	777.00	Magnesium	28600.00	Manganese	854.00	Manganese	718.00	Lead	3.10	Manganese	1010.00	Manganes	382.00
		Magnesium	107000	Manganese	448.00	Manganese	927.00	Lead	2.70 *	Manganese	957.00	Mercury	0.48	Mercury	0.26	Magnesium	289000.00	Mercury	0.47	Mercury	0.68
		Manganese	765	Mercury	0.87	Mercury	0.65	Magnesium	200000.00	Mercury	1.80	Nickel	8.30 *	Nickel	7.00	Manganese	790.00	Nickel	4.20 *	Nickel	3.40 *
		Mercury	1.4	Nickel	18.90 *	Nickel	10.20 *	Manganese	519.00	Nickel	53.40	Potassium	82400.00	Potassium	211000.00	Mercury	0.30	Potassium	29300.00	Potassium	36600.00
		Nickel	15.6	Potassium	7040.00	Potassium	47400.00	Mercury	0.52	Potassium	12700.00	Sodium	1130000.00	Sodium	2810000.00	Nickel	6.80 *	Silver	0.72 *	Sodium	722000.00
		Potassium	58700	Sodium	102000.00	Sodium	709000.00	Nickel	12.80 *	Sodium	195000.00	Vanadium	2.20 *	Vanadium	1.50	Potassium	165000.00	Sodium	430000.00	Vanadium	1.80 *
		Selenium	4.5	Vanadium	3.10 *	Vanadium	3.70 *	Potassium	116000.00	Vanadium	1.80 *	Zinc	46.90	Zinc	37.40	Silver	1.10 *	Vanadium	2.60 *	Zinc	34.90
		Sodium	762000	Zinc	122.00	Zinc	42.40	Sodium	1630000.00	Zinc	283.00					Sodium	2180000.00	Zinc	20.60		
		Vanadium	5.8					Vanadium	0.92 *							Thallium	5.70				
		Zinc	82.6					Zinc	11.10 *							Vanadium	2.90 *				
																Zinc	18.60 *				

TABLE A-8
216 PATERSON PLANK ROAD SITE
SUMMARY OF SURFACE WATER QUALITY DATA
METALS
CARLSTADT, NEW JERSEY

SAMPLE ID	LOCATION	SAMLING DATE																					
		Apr-95 9th O&M		Apr-96 13th O&M		Nov-97 19th O&M		Oct-98 23rd O&M		Dec-99 27th O&M		Dec-00 31st O&M		Nov-01 35th O&M		Sep-02 39th O&M		Nov-03 43rd O&M		Nov-04 47th O&M	
SW-03	Off-Property	Aluminum	121	Aluminum	420.00	Aluminum	733.00	Aluminum	119.00 *	Aluminum	340.00	Aluminum	206.00	Aluminum	150.00	Aluminum	262.00	Aluminum	111.00 *	Aluminum	162.00 *
		Antimony	10	Antimony	3.80 *	Antimony	3.40 *	Arsenic	4.30 *	Barium	55.50 *	Barium	64.90 *	Barium	92.10	Arsenic	3.70 *	Barium	93.30	Antimony	4.50 *
		Barium	72.8	Barium	60.00 *	Barium	62.10 *	Barium	74.50 *	Cadmium	1.30 *	Cadmium	0.66 *	Calcium	118000.00	Barium	93.40 *	Calcium	43600.00	Barium	53.00 *
		Cadmium	0.35	Beryllium	0.61 *	Beryllium	0.11 *	Cadmium	1.50 *	Calcium	44800.00	Calcium	76900.00	Chromium	7.10	Cadmium	0.21 *	Chromium	0.89 *	Calcium	61200.00
		Calcium	79900	Cadmium	1.10 *	Cadmium	0.80 *	Calcium	108000.00	Chromium	18.40	Chromium	8.80 *	Copper	7.20	Calcium	108000.00	Copper	6.20 *	Chromium	4.10 *
		Chromium	11.6	Calcium	41500.00	Calcium	47300.00	Chromium	5.70 *	Cobalt	1.90 *	Cobalt	1.20 *	Iron	827.00	Chromium	9.00 *	Iron	714.00	Copper	6.00 *
		Cobalt	1.4	Chromium	15.80	Chromium	13.70	Cobalt	0.79 *	Copper	20.90 *	Copper	7.00 *	Magnesium	277000.00	Cobalt	0.83 *	Lead	1.60 *	Iron	565.00
		Copper	20.2	Cobalt	1.80 *	Cobalt	0.93 *	Copper	6.20 *	Iron	1930.00	Iron	683.00	Manganese	1140.00	Copper	7.20 *	Magnesium	12900.00	Lead	4.30
		Iron	1840	Copper	40.80	Copper	23.20 *	Iron	755.00	Lead	6.00	Magnesium	121000.00	Mercury	0.47	Iron	1100.00	Manganese	178.00	Magnesiun	91600.00
		Lead	9.4	Iron	1120.00	Iron	1720.00	Lead	2.30 *	Magnesium	32700.00	Manganese	899.00	Nickel	10.60	Lead	3.70	Mercury	0.11 *	Manganesı	421.00
		Magnesium	89000	Lead	3.90	Lead	7.70	Magnesium	189000.00	Manganese	972.00	Mercury	0.77	Potassium	149000.00	Magnesium	250000.00	Nickel	2.00	Mercury	0.44
		Manganese	717	Magnesium	12100.00	Magnesium	47400.00	Manganese	498.00	Mercury	1.60	Nickel	13.00 *	Sodium	1910000.00	Manganese	949.00	Potassium	5340.00	Nickel	2.80 *
		Mercury	1.1	Manganese	523.00	Manganese	729.00	Mercury	0.40	Nickel	40.90	Potassium	66500.00	Vanadium	1.30	Mercury	0.45	Sodium	89800.00	Potassium	37100.00
		Nickel	14.9	Mercury	1.30	Mercury	1.40	Nickel	13.10 *	Potassium	14800.00	Sodium	931000.00	Zinc	56.80	Nickel	7.60 *	Vanadium	0.98 *	Sodium	750000.00
		Potassium	47900	Nickel	40.00	Nickel	14.90 *	Potassium	107000.00	Sodium	228000.00	Vanadium	2.20 *			Potassium	145000.00	Zinc	25.30	Vanadium	1.80 *
		Sodium	641000	Potassium	6810.00	Potassium	23500.00	Sodium	1480000.00	Vanadium	2.30 *	Zinc	62.80			Silver	1.30 *			Zinc	43.50
		Vanadium	5.4	Sodium	73500.00	Sodium	350000.00	Vanadium	0.83 *	Zinc	215.00					Sodium	1890000.00				
		Zinc	58.4	Vanadium	2.90 *	Thallium	5.10 *	Zinc	6.80 *							Thallium	4.90				
				Zinc	144.00	Vanadium	3.70 *									Vanadium	4.40 *				
						Zinc	80.50									Zinc	23.50				
SW-04	Off-Property	Aluminum	298	Aluminum	608.00	Aluminum	563.00	Aluminum	131.00 *	Aluminum	423.00	Aluminum	192.00 *	Aluminum	63.40	Aluminum	198.00 *	Aluminum	175.00 *	Aluminum	223.00
		Antimony	11	Arsenic	5.00 *	Barium	76.50 *	Antimony	2.50 *	Barium	58.60 *	Arsenic	4.90 *	Barium	95.10	Antimony	3.30 *	Arsenic	2.50 *	Barium	54.90 *
		Barium	79.7	Barium	50.60 *	Beryllium	0.17 *	Arsenic	3.20 *	Cadmium	2.10 *	Barium	69.00 *	Calcium	116000.00	Arsenic	4.60 *	Barium	70.50	Beryllium	0.31 *
		Cadmium	0.44	Beryllium	0.31 *	Cadmium	3.70 *	Barium	79.60 *	Calcium	43500.00	Cadmium	0.92 *	Chromium	5.20	Barium	90.80 *	Calcium	42100.00	Calcium	56600.00
		Calcium	76500	Cadmium	1.50 *	Calcium	45500.00	Beryllium	0.27 *	Chromium	22.20	Calcium	74000.00	Cobalt	1.00	Cadmium	0.35 *	Chromium	9.00 *	Chromium	6.00 *
		Chromium	23.8	Calcium	33600.00	Chromium	22.30	Cadmium	1.50 *	Cobalt	2.40 *	Chromium	8.30 *	Copper	8.30	Calcium	101000.00	Copper	6.50 *	Copper	7.60 *
		Cobalt	1	Chromium	19.50	Cobalt	2.20 *	Calcium	102000.00	Copper	27.60	Cobalt	0.88 *	Iron	853.00	Chromium	8.10 *	Iron	2480.00	Iron	703.00
		Copper	21.9	Cobalt	1.50 *	Copper	27.80	Chromium	6.30 *	Iron	2370.00	Copper	8.10 *	Magnesium	257000.00	Cobalt	2.40 *	Lead	3.30	Lead	4.50
		Iron	2380	Copper	39.40	Iron	2540.00	Cobalt	1.10 *	Lead	7.20	Iron	740.00	Manganese	1230.00	Copper	6.20 *	Magnesium	28600.00	Magnesiun	74900.00
		Lead	7.4	Cyanide	20.00	Lead	6.00	Copper	4.50 *	Magnesium	30100.00	Lead	2.60 *	Mercury	0.41	Iron	1750.00	Manganese	480.00	Manganesı	394.00
		Magnesium	74500	Iron	1380.00	Magnesium	30000.00	Iron	790.00	Manganese	1010.00	Magnesium	107000.00	Nickel	10.70	Lead	1.70 *	Mercury	0.67	Mercury	0.67
		Manganese	804	Lead	2.40 *	Manganese	1210.00	Lead	2.20 *	Mercury	2.10	Manganese	874.00	Potassium	148000.00	Magnesium	211000.00	Nickel	6.40	Nickel	3.80 *
		Mercury	1.4	Magnesium	10600.00	Mercury	2.00	Magnesium	176000.00	Nickel	53.30	Mercury	0.62	Sodium	1890000.00	Manganese	1210.00	Potassium	12200.00	Potassium	31100.00
		Nickel	24.5	Manganese	591.00	Nickel	76.50	Manganese	573.00	Potassium	13200.00	Nickel	16.50 *	Vanadium	1.20	Mercury	0.28	Sodium	209000.00	Sodium	620000.00
		Potassium	39900	Mercury	1.90	Potassium	13300.00	Mercury	0.54	Sodium	206000.00	Potassium	58400.00	Zinc	54.40	Nickel	12.60 *	Vanadium	2.60 *	Vanadium	1.80 *
		Sodium	523000	Nickel	49.30	Sodium	210000.00	Nickel	13.90 *	Vanadium	2.30 *	Sodium	841000.00			Potassium	122000.00	Zinc	14.10 *	Zinc	35.00
		Vanadium	6	Potassium	11200.00	Vanadium	3.60 *	Potassium	101000.00	Zinc	300.00	Vanadium	2.30 *			Sodium	1590000.00				
		Zinc	54.1	Sodium	846000.00	Zinc	185.00	Sodium	1510000.00			Zinc	79.60			Thallium	7.30				
				Vanadium	2.70 *			Thallium	3.70 *							Vanadium	6.10 *				
				Zinc	247.00			Vanadium	1.30 *							Zinc	9.70 *				
								Zinc	5.60 *												

*analyte was found in the associated blank as well as in the sample
Concentration exceeds Class SE2 surface water quality standard.
Tables Checked by: APJ and BJS

APPENDIX B

SAMPLING AND ANALYSIS PLAN AND QUALITY ASSURANCE PROJECT PLAN (SAP/QAPP)

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SAMPLING AND ANALYSIS PLAN & QUALITY ASSURANCE PROJECT PLAN
PRE-DESIGN INVESTIGATION
REMEDIAL DESIGN FOR OPERABLE UNIT 2
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY

April 2005

Revision 0

	Signature	Date
Golder Associates Project Manager	_____	
Golder Associates Project QA Manager	_____	

DISTRIBUTION:

3 Copies	U.S. Environmental Protection Agency Region II
3 Copies	New Jersey Department of Environmental Protection
2 Copies	Golder Associates Inc.

April 2005 Project No.: 943-6222

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1.0 PROJECT MANAGEMENT

1.1 Project Background

On behalf of the 216 Paterson Plank Road Cooperating PRP Group (Group), Golder Associates Inc. (Golder Associates) has prepared this Sampling and Analysis Plan and Quality Assurance Project Plan (SAP/QAPP) as part of the Remedial Design Work Plan (RDWP) for the Second Operable Unit (OU-2) at 216 Paterson Plank Road Site (Site) in Carlstadt, Bergen County, New Jersey. The purpose of this SAP/QAPP is to provide additional detail for the investigation and sampling and testing procedures conducted as part of the pre-design investigation (PDI) as described in Section 5.0 of the RDWP.

The general activities which comprise the PDI are as follows:

1. Examine subsurface conditions between the existing slurry wall and previously installed steel sheet pile wall for the design of the planned stream bank enhancements;
2. Establish "mud line" and top of sediment (muck) depths in front of the existing steel sheet pile wall along Peach Island Creek;
3. Establish geotechnical design parameters; and,
4. Generate an updated topographic base map for the Site.

The rationale, objectives, and general technical scope of work for these activities are presented in the RDWP. The remainder of this SAP/QAPP contains detailed procedural information regarding the drilling, sample collection, and geotechnical testing.

The PDI does not include collection of samples for analytical analysis. Therefore, when applicable, this SAP/QAPP was prepared in general accordance with the USEPA guidance documents specified below:

1. Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004), dated October, 1988;
2. EPA NEIC Policies and Procedures Manual (EPA 330/9-78-001-R) dated May 1978, revised May 1986;
3. A Compendium of Superfund Field Operations Methods (OSWER Directive 9355-0-14), December 1987;

4. Guidance for the Data Quality Objective Process, EPA QA/G-4(EPA/600/R-96/055), dated August 2000;

5. EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations (EPA QA/R-5), Interim Final, dated November 1999;

6. EPA Requirements for Quality Assurance Project Plans (EPA QA/R-5), March 2001;

7. Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (OSWER Directive 9355.3-01);

8. Region II CERCLA Quality Assurance Manual, Revision 1, EPA Region 2; (October 1989).

9. Uniform Federal Policy for Quality Assurance Project Plans (EPA 505-B-04-900A), dated July 2004; and,

1.2 Project Organization

Project team members are identified, and contact information provided, in Table B1. The identified project team members have primary responsibility for the project, although other individuals within their respective organizations will be involved. The signatures on the cover sheet of this SAP/QAPP demonstrate the review, approval, acceptance and responsibility for the QA/QC procedures specified herein by the project team.

The lead regulatory agency for the Site is USEPA Region II. Ms. Stephanie Vaughn is USEPA's Remedial Project Manager (RPM). Ms. Riche Outlaw is the New Jersey Department of Environmental Protection (NJDEP) Project Manager for the Site. The NJDEP may also provide regulatory oversight on this project.

Golder Associates is the Remedial Designer and will provide engineering services during the PDI. Mr. Mark F. McNeilly, P.E. will serve as Golder Associates' Remedial Design Project Manager throughout the project. Overall QA/QC of the project, sampling, operations, and data management will be provided by the Golder Associates' QA Manager, Mr. Peter Guy, or his designee.

Golder Associates Inc. (Golder Associates) of Cherry Hill, New Jersey, will provide geotechnical laboratory testing services and Golder Associates' soil laboratory is accredited through the American Association of State Highway Transportation Offices (AASHTO). Drilling services

will be provided by Ameridrill, Inc. of Levittown, Pennsylvania, a New Jersey licensed driller. Surveying services will be provided by James M. Stewart, Inc. of Philadelphia, Pennsylvania, a New Jersey licensed surveyor. The USEPA would be notified if, at any time during this project, the identity or role of any of these key organizations or personnel changes. A copy of Golder Associates' geotechnical (physical/mechanical testing) laboratory Quality Assurance Plan (QAP) can be provided upon request.

The USEPA RPM will coordinate as needed with Ms. Riche Outlaw, the NJDEP Project Manager, and serve as the primary contact with Golder Associates' Project Manager. Golder Associates' Project Manager will provide overall management of activities related to the PDI and coordinate between the agencies and the Project Coordinator. Quality Assurance/Quality Control of the project, sampling, operations, and data management may be provided by the Golder Associates' Quality Assurance (QA) Manager, Peter Guy, or his designee.

1.3 Project Description

The 6-acre 216 Paterson Plank Road Site is a former chemical recycling and waste processing facility that ceased operation in 1980 and was placed on USEPA's National Priorities List (NPL) in 1983. On August 12, 2002, the United States Environmental Protection Agency (USEPA) issued a Record of Decision (ROD) (USEPA, 1993) for the OU-2 that identified the selected final remedy for the fill and shallow groundwater above the clay layer underlying the Site. Groundwater contamination at deeper levels will be addressed as part of Operable Unit 3 (OU-3) in a subsequent remedy selection process. A Consent Decree lodged on July 14, 2004, with an effective date of September 30, 2004, provides for implementation of the OU-2 remedial action by the Group.

The overall purpose of the OU-2 remedy is to provide long-term source control through a combination of treatment and containment. The specific Remedial Action Objectives for OU-2 as described in the ROD are to:

- Mitigate the direct contact risk and leaching of constituents from soil, fill material and sludge into the groundwater;
- Reduce the toxicity and mobility of the Hot Spot constituents via treatment;
- Provide hydraulic control and containment of the shallow aquifer on-Site; and

- Perform remediation in a manner that may allow site re-use for certain limited commercial purposes.

The OU-2 Remedy is the final remedy for the soils (fill) at the Site and includes remediation of the sludge Hot Spot and improvements to the existing interim remedy (OU-1) for the remainder of the Fill Area. The major components of the Selected Remedy include:

- Hot Spot In-Situ Treatment;
- Streambank Enhancements;
- Cover System;
- Upgrading existing groundwater recovery system; and,
- Institutional controls.

Sampling to be performed under this PDI is summarized in Table B2 and the approximate location of the geotechnical soil boring locations are shown on Figure B1.

1.4 Quality Assurance Objectives for Measurement

The USEPA Data Quality Objectives (DQO) Guidance document specifies that the sampling program be designed to meet the requirements of the investigation and achieve the DQOs. Part of this process is to determine which data is being collected and how it will be used in assessing Site conditions. For the purposes of this project, two (2) types of data, definitive and screening, will be produced. Definitive data will be collected from samples that are submitted to the geotechnical laboratory for testing. Screening data will be produced using field measurements (e.g., photo-ionization detector (PID)) for health and safety monitoring during the drilling activities.

As part of the evaluation component of the QA program, results are compared with certain data quality indicators. These data quality indicators are part of the overall DQOs for the project. DQOs for field and geotechnical laboratory testing are provided in Table B3. Table B4 provides details regarding the planned geotechnical testing analyses from the soil samples collected during the PDI.

Quality assurance program objectives for the geotechnical laboratory are presented in the laboratory's QAP which can be provided upon request.

1.5 Training Requirements/Certifications

Samples will be collected by personnel trained in the use of the sampling equipment. Training will include use of proper sampling protocols as well as Health and Safety procedures. Laboratory personnel will have been trained in the testing of samples and the review of testing r esults. Personnel performing the investigation activities will be required to present documentation of OSHA 40-hour HAZWOPER training and annual updates prior to actively performing intrusive work activities at the Site.

1.6 Documentation and Records

All field records will be compiled and retained in Golder Associates' project files. Field parameter data collected during the investigation will be included in the Remedial Design Reports. Geotechnical testing results data packages will contain all information necessary to satisfy the most recent and currently available ASTM specifications.

The laboratory will keep sample evidence files containing the following items:

- Sample log-in information (if applicable);
- Copies of laboratory records and notebook pages;
- Pertinent correspondence memoranda; and,
- Final project file.

Golder Associates will retain relevant and appropriate project information in project files. The information contained in these files includes, but is not limited to, the following items:

- Field notes and information;
- Correspondence and telephone memoranda;
- Meeting notes;
- Laboratory information;
- Reference information;
- Audit information; and,
- Copies of reports.

These files will be retained for a minimum of ten (10) years following commencement of construction of the Remedial Action. If the laboratory cannot retain its records for the 10-year period, all laboratory records will be provided to Golder Associates or the PRP Group for retention.

2.0 DETAILED SITE INVESTIGATION PROCEDURES

2.1 Decontamination and Waste Handling

Drill rigs and downhole drilling equipment will be decontaminated prior to use at the Site and prior to demobilization from the Site. Decontamination will include steam cleaning and manual scrubbing, as necessary, to remove any visible contamination. An on-site decontamination pad will be constructed at the approximate location shown on Figure B1. Decontamination will be conducted at the designated decontamination area at all times.

All drill cuttings generated during the drilling investigation and water generated from drilling and decontamination, will be placed in D.O.T. approved 55-gallon drums or a lined roll-off and staged on-site for subsequent disposal as Investigation Derived Waste (IDW).

2.2 Geotechnical Investigation

All borings will be drilled by a New Jersey licensed well driller, and supervised by a representative of Golder Associates under the supervision of a Professional Engineer licensed in the State of New Jersey. Because the anticipated depth of each boring is greater than 25 feet, a NJDEP Well Drilling Permit will be obtained prior to start of fieldwork.

Boring will be completed using hollow-stem auger drilling techniques. To protect the geomembrane (infiltration barrier), an all terrain vehicle (ATV) with rubber mounted tires or similar equipment will be used. Additionally, a protective covering (e.g. plywood) will be placed on top of the geomembrane in front of the drill rig as it advances to each boring location and beneath each of the rig set hydraulic jacks.

Access to soil boring locations will also require careful maneuvering around the above ground piping, or, if necessary, placing a ramp over the piping or temporarily removing the lines. The USEPA will be immediately notified of any impact or damage to the extraction system. If any repairs to the extraction system are necessary, the USEPA will be notified prior to commencing the work. Access to soil borings may also require the temporary removal and replacement of the perimeter fence along Peach Island Creek.

A minimum area of geomembrane will be cut and removed in order to advance the drill bit and rods. Following completion of the boring, the exposed area will be temporarily covered with plastic, secured with sandbags or wood. Upon completion of the investigation, the geomembrane will be repaired by an approved geosynthetic installer in accordance with Section 4.2 of the Operation and Maintenance Plan (Canonie Environmental, July 19, 1991).

A total of five soil borings (RD-01 through RD-05) are proposed between the existing slurry and sheet pile walls (refer to Figure B1). Borings will be drilled from the existing ground surface and terminate within the underlying glacial till stratum. Hence, these borings would be drilled about 40 to 50 feet below ground surface (bgs). Soil samples will be continuously collected using a combination of a split barrel samples and Shelby tubes in accordance with ASTM Standards D1586 and D1587, respectively. Standard Penetration Test results (SPT N-Values) will be recorded and noted on field borehole logs, and soil samples will be collected for verification of field soil descriptions and sample selection for laboratory testing (i.e., moisture content, Atterberg Limits, particle size analysis). Undisturbed Shelby tube samples (3-inch diameter) will be attempted in the underlying soft peat, organic silt, and clay deposits at a minimum frequency of one per borehole. Shelby tube sampling will be conducted in general accordance with ASTM D1587 Standard Practice for Thin-Walled Tube Sampling for Soils. A 3-inch diameter OD Shelby tubes will be connected to a head assembly and lowered down the borehole. The Shelby tube will be pushed into the designated stratum using a slow steady pressure with no rotation. The tube will be left in place approximately 5-10 minutes to dissipate negative pore pressures. The tube will then be sheared from the in-situ soils, by turning the drill rods, and then raised to the surface. The total recovery of the sample will be measured and the tube will be labeled, capped and sealed with wax or paraffin.

The borehole will then be advanced to within the underlying glacial till stratum. The tubes will be transported to the geotechnical laboratory, as soon as practicable, in a manner which minimizes disturbance. The samples will be tested for moisture content (ASTM D2216), Atterberg Limits (ASTM D4318), percent passing #200 sieve (ASTM D1140), particle size analysis (ASTM D422), 1-D consolidation (ASTM D-2435), unconsolidated undrained tri-axial shear (ASTM D-2850), and consolidated undrained triaxial shear (ASTM D-4767). The samples will be selected for laboratory analysis based on sample recovery, visual examination of samples and recorded N-values.

In the event that undisturbed Shelby tube soil samples cannot be obtained due to materials being to soft, consideration will be given to undertaking in-situ van shear testing to collect the necessary soil strength design parameters, and all vane shear tests would be performed in accordance with ASTM D2573-01.

During drilling activities, water level measurements will be collected and recorded where/when observed. In addition, water level measurements will be collected for all existing piezometers within the vicinity of each borehole.

Drill cuttings and fluids will be collected and disposed off-site in accordance with federal, state, and local regulations or placed under the cover during the remedial action. Upon completion of the drilling activities, all borings will be sealed in accordance with NJDEP requirements.

It should be noted that boreholes may meet refusal due to the presence of construction debris prior to encountering natural materials. If construction debris is encountered and drilling cannot be advanced to deeper depths, a maximum of three (3) boreholes will be attempted at each associated drilling location, and these alternate locations would typically be about 5 feet from each other at any one boring location.

2.3 Field Documentation

In order to ensure that all pertinent information and data collected during the performance evaluation are documented completely and correctly, the following procedures and protocols described in the following sections will be implemented.

2.3.1 Field Notebooks

All information pertinent to the field investigation will be recorded in bound and numbered field notebooks. All field notes must be legible. Any errors should be crossed out with a single line and initialed. Each team member will be assigned an individual notebook. Field records should at a minimum contain the following information:

- Date;
- Project or site name;
- Time of each data entry;
- Description of work being performed that day;

- Names and affiliations of personnel at location;
- Weather conditions on site;
- Location and type of activity;
- Visual observations;
- Pertinent field data (and any other measurements);
- Serial numbers, if any, on seals, and transportation cases, and equipment;
- Name of field custodian;
- Photographs taken, including date, time, direction faced, description of subject or activity, sequential number of the photo and film roll number will be recorded in the field notebook; and,
- Log of borehole

Specific sample information will be compiled into the field notebook. All field notebooks will be standard engineering hardbound books. All field notebooks will be photocopied so that copies of field notes can be kept in appropriate project files.

2.3.2 Field Instruments

Calibration of field instruments for health and safety monitoring (e.g., PID meter) should be documented including:

- Date and time of calibration;
- Date and time and results of calibration checks;
- Instrument type, model number, and serial number (if present); and,
- Manufacturer, concentration, and lot number of calibration standards that are used.

2.3.3 Photo-Documentation

When photographs are taken, field personnel will record time, date, site location, general direction faced, sequential number of photograph, and brief description of the subject in a field notebook.

2.3.4 Correspondence/Communications

Correspondence received or sent from the field will be dated and labeled with a project filing identification number. Telephone conversations will be documented and filed.

2.3.5 Changes in Procedures

Approval from the USEPA Remedial Project Manager will be obtained as needed prior to implementation for major changes in sampling procedures as outlined in this SAP/QAPP. Minor

procedural changes will be made by Golder Associates' personnel, and if present, with the concurrence of the on-site USEPA representative. Changes will be documented in the field notebooks.

2.4 Sample Handling and Custody Requirements

2.4.1 Sample Handling

The methods and references for collecting samples are previously provided in this section. The geotechnical laboratory supplies appropriate containers (e.g., soil jars and Shelby tubes). All testing will be done in accordance with the published and currently available ASTM specifications.

2.4.2 Sample Identification

All samples shall be adequately marked for identification from the time of collection and packaging through shipping and storage. Sample identification shall include, as a minimum:

- Project name and/or code;
- Sample identification number;
- Borehole designation;
- Sample date and time;
- Initials of the individual performing the sampling ; and,
- Driving resistance for each 6-inches of penetration.

Each sample will be assigned a unique sample identification number to be recorded on the sample label. Each sample identification number will be recorded in the field notebook and, as applicable, on chain-of-custody documentation. Designations for sample identification numbers for this project are described below.

Equipment

- Water proof marking pen;
- Labels;
- Transparent tape; and,
- Site base map with designated sampling locations.

Procedure

Sample labels should be marked with a unique sample identification number. The corresponding sample ID should be marked on the Site base map for correlation during report preparation.

2.5 Geotechnical Testing Requirements

All samples collected and tested during the PDI will comply with ASTM methods, as listed in ASTM Specifications for Soils and Rock (Volume 04.08, 2004).

Method references for the testing to be performed for the PDI are summarized in Table B4. Information regarding the geotechnical laboratory's equipment and capability to perform the testing are contained in the laboratory QAP, which can be provided upon request.

2.6 Data Management

Data collection during the PDI will be retained in both hardcopy and electronic format. Data collected in the field will be transcribed from field forms or notebooks and tabulated, as appropriate. Data entry will be checked to ensure no transcription errors occurred. Tabulated data will be provided in the investigation reports.

3.0 ASSESSMENT/OVERSIGHT

3.1 Assessments and Response Actions

The performance of activities or procedures must comply with those specified in this SAP/QAPP. The responsible personnel must be prepared to justify that the specified procedure or reference method was implemented properly. Deviations of a technical procedure or reference method must be noted within the appropriate logbook and, for geotechnical laboratory analyses, in the data package report.

Performance will be monitored in the field through the use of QC checks. As described in the guidance documents, assessment includes surveillance, peer review, management systems review, readiness review, technical systems audit, performance evaluation, data quality audit, and data quality assessment. For performance monitoring, the following assessment activities are planned:

- Surveillance;
- Peer review;
- Technical systems audit; and,
- Data quality assessment

3.1.1 Surveillance

During the course of sample collection, it is anticipated that the Agencies will provide oversight services for specific activities. This oversight will be geared to ensuring that sampling procedures and activities discussed in the SAP/QAPP are properly executed. It has been assumed that the Agencies will provide feedback to the sampling team, Golder Associates, and the PRP Group regarding any issues arising from oversight.

Golder Associates will notify USEPA and NJDEP at least 5 working days prior to performance of fieldwork. These notifications will be made via letter or electronic mail to the USEPA and NJDEP Project Managers.

3.1.2 Peer Review

Throughout the project, Golder Associates will maintain a system of peer review by which data generated can be checked and verified. Data that is transcribed and tabulated will be checked for accuracy and completeness.

3.1.3 Audits

The QA/QC audit is an independent systematic on-site review of facilities, equipment, training procedures, record keeping, data validation, data management, and reporting aspects of the field and laboratory QA/QC program. Audits may be performed on field operations and sampling procedures, laboratory testing and documentation.

3.1.3.1 Field/Sampling Audit

Golder Associates' field team leader will be responsible for ensuring that the applicable quality assurance procedures described in this SAP/QAPP are followed. An on-site USEPA representative may audit field activities, with respect to the technical requirements, procedures, and protocols established in the SAP/QAPP. Activities that may be audited are described below.

- Field sampling activities;
- Documentation of activities (logbooks, etc.);
- Equipment decontamination;
- Use of proper sampling equipment;
- Proper sample identification; and,
- Chain-of-custody.

3.1.3.2 Laboratory Audits

The geotechnical laboratory is expected to have a QA program whereby internal audits are conducted routinely as described in the laboratory QAP. In accordance with the laboratory QAP, the lab is audited annually internally and every 20 months by AASHTO as per the AASHTO requirements for accreditation. If an external audit is deemed necessary by the Agencies, the Agencies will consult with the Respondents and Golder Associates regarding an appropriate approach.

3.1.3.3 Data Quality Assessment

Geotechnical testing result data packages will contain all information necessary to satisfy the most recent and currently available ASTM specifications.

3.1.4 Corrective Actions

If through the data assessment process problems are identified, corrective actions will be initiated. All identified QA problems and corrective actions will be documented to provide a complete record of QA activities and help identify needed long-term corrective actions.

The detection of system and performance problems and the corrective actions procedures used in the field during monitoring and sample collection will be documented in the field notebooks or Sample Collection Forms with copies placed in Golder Associates' project files. Any problems that cannot be resolved by the sampler or Field Team Leader will be brought to the attention of Golder Associates' Project Manager. Golder Associates' Project Manager and USEPA Project Manager (if necessary) will determine the corrective action to be taken, if any.

Corrective Action procedures and documentation used by the geotechnical laboratory will follow AASHTO procedures. Any problems which cannot be resolved by lab personnel, laboratory managers or laboratory quality assurance officers will be brought to the attention of Golder Associates' Project Manager and Project Quality Assurance Manager. Golder Associates' Project Manager and USEPA Project Manager (if necessary) will determine the corrective action to be taken, if any.

3.2 Reports to Management

Timely QA reports are necessary to the successful completion of this project. Quality assurance deficiencies in the field must be reported to the Field Team Leader and Golder Associates' QA and Project Manager. Quality assurance deficiencies in the laboratory must be reported in a timely manner to laboratory and project management personnel. The laboratory's policies and procedures for reporting quality assurance activities to management are included in their QAP and/or SOPs. Corrective actions for field and laboratory activities will be reported to Golder Associates' QA and Project Manager, and, if necessary, the USEPA QA Manager and Region II Project Manager.

4.0 DATA REVIEW AND USABILITY

In general, data reduction of field measurements will not be necessary because all readings will be recorded in field notebooks and recorded on the field boring logs.

The geotechnical soil laboratory will perform a review of the data in accordance with ASTM and AASHTO requirements.

4.1.1 Data Reporting

Field measurements recorded during field activities will be recorded in field notebooks and on the field boring logs. Geotechnical laboratory data will be reported by the laboratory in a data package report and this data will be provided in the Remedial Design Reports.

Table B1
Project Personnel
Pre-Design Investigation
Remedial Design for OU-2
216 Paterson Plank Road Site
Carlstadt, New Jersey

USEPA Remedial Project Manager:	Stephanie Vaughn USEPA Region II 290 Broadway New York, NY 10007-1866 Telephone: (212) Facsimile: (212)
NJDEP Project Manager:	Riche Outlaw NJDEP 401 East State Street P.O. Box 413 Trenton, NJ 08625-0413 Telephone: (609)
Golder Associates Project Coordinator	Steve Finn, C. Eng. Golder Associates Inc. 1951 Old Cuthbert Road, Suite 301 Cherry Hill, NJ 08034 Telephone: (856) 616-8166 Facsimile: (856) 616-1874
Golder Associates PDI Project Manager:	Mark McNeilly, P.E. Golder Associates Inc. The Federal Trust Building 24 Commerce Street Newark, NJ 07102 Telephone: (973) 621-0777 Facsimile: (973) 621-7725
Golder Associates Field Team Leader and Site Health and Safety Officer:	TBD
Golder Associates Quality Assurance Manager:	Peter Guy Golder Associates Inc. 1951 Old Cuthbert Road, Suite 301 Cherry Hill, NJ 08034 Telephone: (856) 616-8166 Facsimile: (856) 616-1874
Geotechnical Laboratory Manager:	Robert Wilkinson Golder Associates Inc. 1951 Old Cuthbert Road, Suite 301 Cherry Hill, NJ 08034 Telephone: (856) 616-8166 Facsimile: (856) 616-1874

Table B1
Project Personnel
Pre-Design Investigation
Remedial Design for OU-2
216 Paterson Plank Road Site
Carlstadt, New Jersey

Drilling Services:	Dennis Moore AmeriDrill, Inc. 1201 Edgely Road Levittown, PA 19057 Telephone: (215) 269-7300 Facsimile: (215) 269-7320
Surveyor:	James M. Stewart, Inc. 9622 Evans Street Philadelphia, AP 19115 Telephone: (215) 969-1577 Facsimile: (215) 969-0338

Table B2
Summary of Pre-Design Investigation Sampling
Remedial Design for OU-2
216 Paterson Plank Road Site
Carlstadt, New Jersey

Sampling Points	Sampling Activity	Sampling Frequency	Sampling Parameters	Purpose/Objective of Activity
RD-01 through RD-05	Geotechnical Soil Borings	Continuous	Moisture content, atterberg limits, grain size analysis (sieve plus hydrometer), 1-D consolidation, unconsolidated/undrained tri-axial shear, and consolidated/undrained tri-axial shear	To determine geotechnical design parameters of subsurface materials between the existing slurry wall and sheet pile wall for the design of streambank enhancements

TABLE B3
LEVELS OF QUALITY ASSURANCE AND ANALYTICAL DATA METHODOLOGIES
PRE-DESIGN INVESTIGATION
REMEDIAL DESIGN FOR OU-2
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY

Level	Description	Associated On-Property Activity
I	Level I is the lowest quality data but provides the fastest results. Field screening or analysis provides Level I data. It can be used for health and safety monitoring and preliminary screening of samples to identify those requiring confirmation sampling (Level IV). The generated data can indicate the presence or absence of certain constituents and is generally qualititative rather than quantitative. It is the least costly of the analytical options.	- Health and Safety Monitoring
II	Level II data are generated by field laboratory analysis using more sophisticated portable analytical instruments or a mobile laboratory onsite. This provides fast results and better-quality data than in Level I. The analyses can be used to direct a removal action in an area, re-evaluate sampling locations, or direct installation of a monitoring well network.	- Not Applicable
III	Level III data may be obtained by a commercial laboratory with or without CLP procedures. (The laboratory may or may not participate in the CLP.) The analyses do not usually use the validation or documentation procedures required of CLP Level IV analysis. The analyzed parameters are relevant to site characterization risk assessment, and design of the remedial action.	- Not Applicable
IV	Level IV data are used for risk assessment, engineering design, and cost-recovery documentation. All analyses are performed in a CLP analytical laboratory and follow CLP procedures. Level IV is characterized by rigorous QC protocols, documentation, and validation.	- Not Applicable
V	Level V data are those obtained by nonstandard analytical procedures. Method development or modification may be required for specific constituents or detection limits.	- Not Applicable
OTHER	Other Methodologies not described above.	- Geotechnical Parameters

(1) EPA DQO Guidance Documents.

TABLE B4
GEOTECHNICAL TESTING METHODS
PRE-DESIGN INVESTIGATION
REMEDIAL DESIGN OU-2
216 PATERSON PLANK ROAD SITE
CARLSTADT, NJ

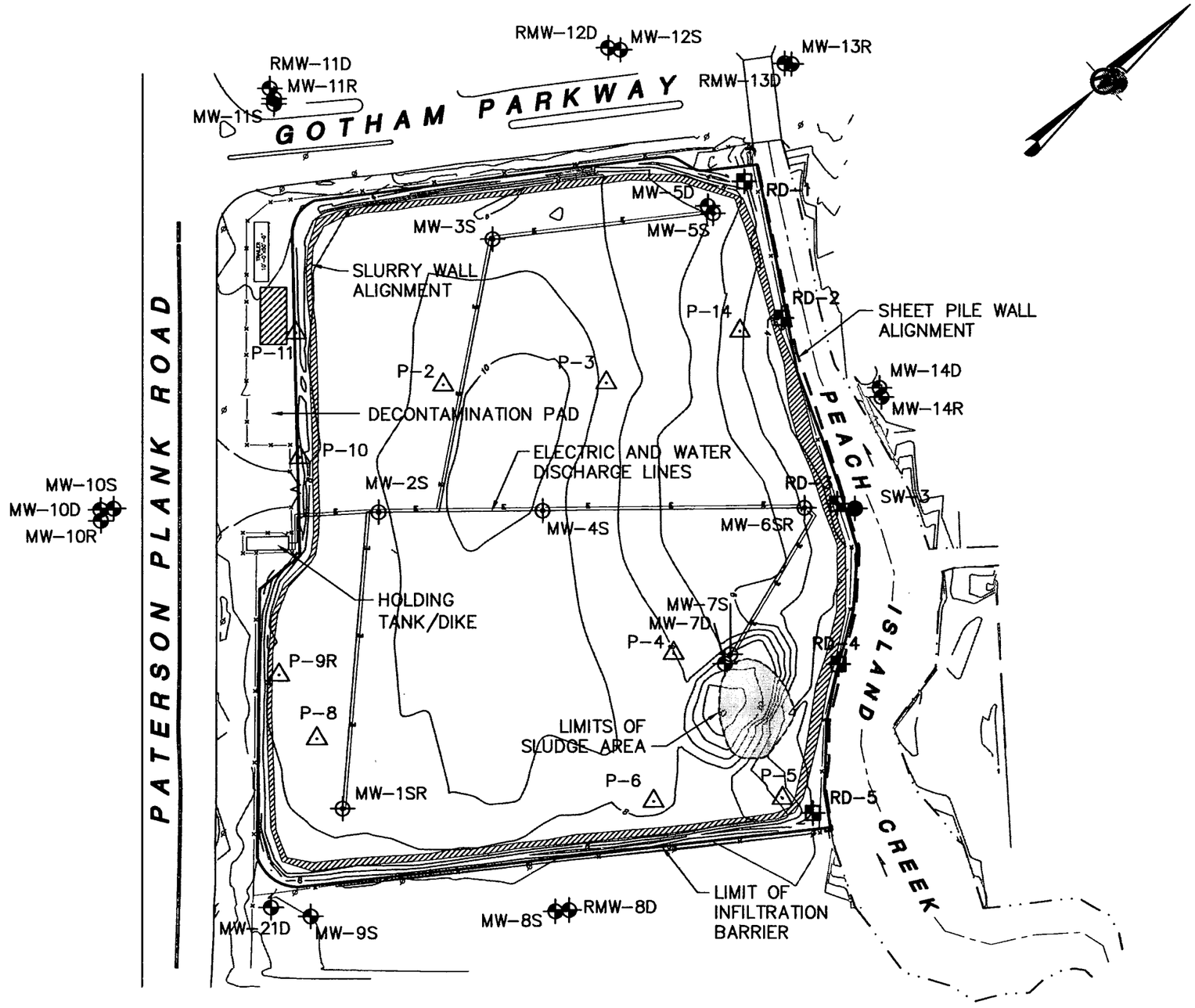
PARAMETER (1)	METHODOLOGY	CONTAINER	PRESERVATION	HOLD TIME	ESTIMATED NUMBER OF ANALYSES (2)
Particle Size Analysis	ASTM D-421/422	SS/ST	None	NA	8
Moisture Content	ASTM D-2216	SS/ST	None	NA	25
Hydrometer (Finer than 200 Sieve)	ASTM D-1140	SS/ST	None	NA	10
Consolidated/undrained Tri-Axial Shear (a)	ASTM D-4767	ST (b)	(c)	NA	3
Unconsolidated/Undrained Tri-Axial Shear	ASTM D-2850	ST (b)	(c)	NA	6
1-D Consolidation (with extra reload/unload cycle)	ASTM D-2435	ST (b)	(c)	NA	6
Soil Classification	ASTM D-2487	SS/ST	None	NA	All samples
Atterberg Limits	ASTM D-4318	SS/ST	None	NA	16

NOTES:

1. ASTM = American Society for Testing and Materials, Volumes 04.08, 2004.
(a) Consolidated undrained triaxial compression with pore water pressure measurement.
(b) Shelby tube samples only - Minimum of 24 inches recovery per tube, if possible.
(c) Wax-sealed ends with caps; store and transport to laboratory in a vertical position.

NA = Not Applicable
SS = Split Spoon
ST = Shelby Tube

2. Actual geotechnical laboratory testing program will be determined based on samples collected in the field and conditions encountered during drilling.



LEGEND

- EXISTING GROUND CONTOUR
- STREAM
- FENCE
- UTILITY POLE
- RD-1 — PROPOSED PRE-DESIGN INVESTIGATION BORINGS
- SW-3 — EXISTING SURFACE WATER SAMPLING LOCATION (SEE NOTE 3)
- MW-4S — EXISTING GROUNDWATER EXTRACTION WELLS
- MW-13R — EXISTING GROUNDWATER MONITORING WELL
- P-3 — EXISTING PIEZOMETER
- SLURRY WALL ALIGNMENT
- SHEET PILE WALL ALIGNMENT
- LIMIT OF INFILTRATION BARRIER

NOTES

1.) TOPOGRAPHIC DATA AND SURFACE FEATURES BASED ON INFORMATION BY TAYLOR, WISEMAN & TAYLOR CONSULTING ENGINEERS/SURVEYORS/PLANNERS/ LANDSCAPE ARCHITECTS, MOUNT LAUREL, NEW JERSEY, DATED 06/12/92, SCALE 1"=40'.

2.) APPROXIMATE LIMITS OF SLUDGE AREA ARE TAKEN FROM THE FOCUSED FEASIBILITY STUDY INVESTIGATION REPORT (GOLDER, 1997).

3.) SURFACE WATER SAMPLING POINT SW-1 IS LOCATED AT THE CONFLUENCE OF PEACH ISLAND AND BERRY'S CREEKS, APPROXIMATELY ONE THIRD OF A MILE NORTHWEST OF THE SITE. SURFACE WATER SAMPLING POINT SW-2 IS LOCATED ON PEACH ISLAND CREEK, 150 FEET NORTHWEST OF THE SITE AS MEASURED FROM THE NORTH CORNER OF THE PROPERTY BOUNDARY. SURFACE WATER SAMPLING POINT SW-4 IS LOCATED ON PEACH ISLAND CREEK, 150' EAST OF THE SITE, AS MEASURED FROM THE EAST CORNER OF THE PROPERTY BOUNDARY.

100 0 100
SCALE FEET

"MEADOWLANDS SPORTS COMPLEX"

Drawing file: 9436222E007.dwg Apr 01, 2005 - 12:24pm

NJ Authorization #24GA28029100
Golder Associates
Philadelphia USA

FILE No.	9436222E007
PROJECT No.	943-6222
REV.	0
SCALE	AS SHOWN
DATE	04/01/05
DESIGN	SDM
CADD	RG
CHECK	SDM
REVIEW	RJI

TITLE

PRE-DESIGN INVESTIGATION GEOTECHNICAL SOIL BORING LOCATIONS

216 PATERSON PLANK ROAD SITE

FIGURE B1

APPENDIX C

HEALTH AND SAFETY PLAN (HASP)

Golder Associates Inc.

1951 Old Cuthbert Road, Suite 301
Cherry Hill, NJ 08034
Telephone (856) 616-8166
Fax (856) 616-1874
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HEALTH AND SAFETY PLAN
PRE-DESIGN INVESTIGATION
REMEDIAL DESIGN FOR OPERABLE UNIT 2
216 PATERSON PLANK ROAD SITE
CARLSTADT, NEW JERSEY

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3 Copies	U.S. Environmental Protection Agency Region II
3 Copies	New Jersey Department of Environmental Protection
2 Copies	Golder Associates Inc.

April 2005

Project No.: 943-6222

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1.0 GENERAL INFORMATION AND SCOPE OF WORK

1.1 Project Description

This Health and Safety Plan (HASP) has been prepared by Golder Associates Inc. (Golder Associates) to perform a pre-design investigation (PDI) as part of the Remedial Design Work Plan (RDWP) for the the Second Operable Unit (OU-2) at the 216 Paterson Plank Road Site (Site) in Carlstadt, Bergen County, New Jersey. The purpose of this HASP is to cover field activities implemented at the Site as described in Section 5.0 of the RDWP and the Sampling and Analysis Plan and Quality Assurance Project Plan (SAP/QAPP).

This plan was prepared in accordance with "Guidance for Conducting Remedial Investigations and Feasibility Studies (RI/FS) under CERCLA" and the NIOSH/OSHA/USCG/EPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" as well as 29 CFR 1910.120, 29 CFR 1926 and applicable Federal and state regulations and guidelines. This plan supersedes any previous Health and Safety Plans prepared for the Site. It will be reviewed as appropriate when field and/or laboratory data becomes available and amended to ensure that the proper level(s) of protection are maintained.

This plan covers field activities associated with drilling and the collection of samples for geotechnical testing. Boreholes will be drilled between the existing slurry wall and previously installed steel sheet pile wall located along Peach Island Creek. Each boring will be approximately 50 feet deep. The location of the borings (RD-01 through RD-05) are shown on Figure B1 of the SAP/QAPP.

1.2 Site Background

The 6-acre Site is a former chemical recycling and waste processing facility which ceased operation in 1980 and is located in a light industrial/commercial area of Carlstadt, New Jersey (Figure B1 in the SAMP/QAPP). The property is bordered to the southwest by Paterson Plank Road, to the northwest by Gotham Parkway, to the southeast by a trucking company, and to the northeast by Peach Island Creek. The Site was placed on USEPA's National Priorities List (NPL) in 1983.

Previous investigations on the Site have determined that soils and groundwater are contaminated with volatiles and semi-volatile compounds, pesticides, PCBs, and inorganic compounds.

Work on this project will take place at locations on-Site. Intrusive activities in all areas will require compliance with 29 CFR 1910.120 and additional precautions may be necessary due to the public's proximity to these areas. Unauthorized persons entering work areas will be asked to immediately leave. Should they ignore this request, Carlstadt Police will be notified and asked to come to the Site.

1.3 Project Safety Requirements

The level of protection and the procedures specified in this HASP are based on the information currently available and represent the minimum health and safety requirements to be observed by all Site personnel engaged in the Investigations. Unknown conditions at the Site locations may exist and known conditions may change. Should any situation arise which is beyond the scope of the personal protection and decontamination procedures specified herein, work activities shall be immediately halted pending discussion with the Health and Safety Officer (HSO) and Project Manager, and revision of the specified health and safety procedures. Any revision of the health and safety procedures will be recorded in the Field Procedure Change Authorization Form, shown in Attachment C-1, and will require authorization from the Health and Safety Officer and the Project Manager.

All Site personnel engaged in project activities must read this document carefully and complete the Safety Briefing Form in Attachment C-2. Personnel who have any questions or concerns regarding implementation of this plan are encouraged to request clarification from the Health and Safety Officer or on-site Health and Safety Coordinator. All personnel must follow the designated health and safety procedures, be alert to the hazards associated with working close to vehicles and equipment, and above all else, use common sense and exercise reasonable caution at all times.

1.3.1 Designated Safety Personnel and Chain of Command

Personnel responsible for implementing this HASP include the following:

TBD	Golder Associates Site Health and Safety Coordinator
Marie Lewis	Golder Associates Health and Safety Officer
Mark McNeilly, P.E.	Remedial Design Project Manager

Each subcontractor will have a designated Site Health and Safety Coordinator. Health and Safety Coordinators are responsible for assuring that the designated procedures are implemented in the field. The Golder Associates Site Health and Safety Coordinator is responsible for coordinating site safety activities.

The Health and Safety Officer has overall responsibility for establishing appropriate health and safety procedures for the project and will have the requisite authority to implement those procedures including, if necessary, the authority to temporarily shut the project down for health and safety reasons.

The Project Manager also has the authority to take whatever actions may be necessary, based on the advice and direction of the Health and Safety Officer, to provide a safe working environment for all project personnel.

The ultimate responsibility for the health and safety of the individual employee rests with the employee, and his or her colleagues. Each employee is responsible for exercising the utmost care and good judgment in protecting his or her own health and safety and that of fellow employees. Should any employee observe a potentially unsafe condition or situation, it is the responsibility of that employee to immediately bring the observed condition to the attention of the appropriate health and safety personnel as designated above, and to follow-up the verbal notification by completing the "Unsafe Conditions and Practices" report form provided in Attachment C-3.

Should an employee find himself or herself in a potentially hazardous situation, the employee shall immediately discontinue the hazardous procedure(s) and either personally effect appropriate preventative or corrective measures, or immediately notify the Site Health and Safety

Coordinator or Project Manager of the nature of the hazard. In the event of an immediately dangerous or life threatening situation, the employee always has "stop work" authority.

Unsafe work practices or procedures are never justified by "extenuating circumstances" such as budget or time constraints, equipment breakdown, changing or unexpected conditions, etc.. In fact, the opposite is true. Under stressful circumstances all project personnel must be mindful of the potential to consciously or unconsciously compromise health and safety standards, and be especially safety conscious. All Site personnel are required to consider "safety first" at all times.

1.3.2 Medical Surveillance and Training

All personnel engaged in field activities on this project must have baseline physical examinations and be participants in their employer's medical surveillance program. This program must meet, at a minimum, the requirements of 29 CFR 1910.120(f). Procedures beyond baseline physical and routine medical surveillance are not planned for the tasks listed in this HASP.

All project personnel, who have potential to contact contaminated soil, water, and/or air, must be trained in hazardous waste site investigation health and safety in accordance with 29 CFR 1910.120(e) including respiratory protection, personal protective clothing, decontamination, hazard recognition and the proper calibration and use of the combustible gas indicator (CGI), photoionization detector (PID), and colorimetric detector tubes. Personnel must have appropriate refresher courses as detailed in 29 CFR 1910.120(e). Supervisory personnel will have completed the supervisor training requirement detailed in 29 CFR 1910.120(e).

Personnel who operate specialized equipment (e.g., drill rigs, forklifts) shall be trained by their employer(s) to operate such equipment.

These training requirements apply to all employees unless the employer can demonstrate that the operation does not involve employee exposure, or the reasonable possibility for employee exposure, to safety and health hazards. Some non-intrusive activities (e.g. supply delivery, limited surveying activities) may meet this exemption. In that site conditions are subject to change, the training requirements for non-intrusive activities will be reviewed on a case-by-case basis. The Site Health and Safety Coordinator will make the determination on the case by case basis and will consult the Health and Safety Officer as necessary.

1.3.3 First Aid

A first aid kit shall be available in all field vehicles and in the on-site trailer during all site activities. This kit shall be of an appropriate size in relation to the number of personnel on site and shall include at a minimum two pairs of latex gloves, CPR barrier and eye wash solution, in addition to first aid supplies (e.g., bandages, first aid cream, antiseptic).

1.3.4 Communications

There will be an on-site trailer equipped with a phone. In addition, a mobile phone will be located in a designated field vehicle. Note that mobile phones operating outside of their original territory may not contact the proper (i.e. local) emergency response authorities. Mobile phone users would be better served by dialing the full emergency response number.

Additionally, if field operations require that two or more field teams work at the Site, but beyond visual/aural range two-way radios may be necessary to maintain communications.

The protective equipment requirements for some tasks may necessitate the use of respiratory protection which could adversely affect communications. In such instances, the field team will review basic hand signal communications during a safety briefing prior to donning respiratory protection equipment.

1.4 General Hygiene and Conduct Guidelines

The following general personal hygiene and work practice guidelines are intended to prevent injuries and adverse health effects. These guidelines represent the minimum standard procedures for reducing potential risks associated with various aspects of this project and are to be followed by all Site personnel at all times.

- A multi-purpose dry chemical fire extinguisher, a complete field first aid kit, and a bottle of emergency eye wash solution shall be maintained in every field vehicle. Additionally, Site trailers will also be equipped with these emergency items.
- Do not handle waste samples or any other potentially contaminated items unless wearing NBR (nitrile butadiene rubber) or neoprene rubber gloves, or equivalent, as a minimum. Employees should treat all soil and water as if it were contaminated. Always make an effort to approach any potentially contaminated feature/facility from upwind.

- Thoroughly wash hands and face before eating or putting anything in your mouth (i.e., avoid hand to mouth contamination).

- Eating, drinking, chewing gum or tobacco and smoking are permitted only in areas designated by the Site Health and Safety Coordinator. Under no circumstances will these activities be permitted in the immediate vicinity of any intrusive activities (e.g., drilling).

- Be alert to potentially changing exposure conditions, for example, as evidenced by perceptible odors or oily sheen on water.

- Do not, under any circumstances, enter or ride in or on any backhoe bucket, materials hoist, or any other similar device not specifically designed for carrying human passengers.

- Be alert to the symptoms of fatigue and heat/cold stress, and their affects on the normal caution and judgment of personnel.

- Noise may pose a health and safety hazard, particularly during drilling and construction activities. A good rule of thumb is if it is necessary to shout to communicate at a distance of three feet in steady state (continuous) noise, hearing protection should be worn. Likewise, any impact noises from activities (e.g., driving casing on a drilling operation) which is loud enough to cause discomfort, would also indicate the need for hearing protection. Hearing protection is available and is included in the standard field kit along with hard hat and safety glasses.

- Always use an appropriate level of personal protection. Reduced levels of protection can result in preventable exposure; excessive levels of safety equipment can impair efficiency and increase the potential for accidents to occur.

- Be aware of the effect of inclement weather (rain, snow, ice, lightning) has on Site safety. Be prepared to suspend activities as conditions warrant.

- Extreme caution must be used when drilling or other activities occur near overhead utility lines. The National Drilling Federation recommends a minimum distance of 20 feet between the lines and drill rig. Contact the local power company if you have any questions regarding utility line status or voltage. In addition, underground utilities must be positively located and marked prior to intrusive activities.

- All personnel are required to wear orange colored vests when working in the proximity of public rights-of-way and/or parking areas. Additionally, traffic cones and other warning devices may be required if the public rights-of-way are obstructed.

1.5 Site Safety Meetings

Site Health and Safety Coordinators shall conduct a Site safety briefing for all personnel on their initial arrival at Site. All personnel will be required to read the Health & Safety Plan and will be required to sign the declaration in Attachment C-2 before conducting any work on-site.

Site Health and Safety Coordinators or his/her designee shall conduct and document daily safety meetings. The topics to be covered are determined by the task activities, and should include:

- Weather and traffic related safety issues.
- Hazards specific to the task(s) and protective equipment.
- Unusual site conditions/areas.
- Safety problems and issues.
- Changes in the HASP.

The date, time, content and attendees of each meeting shall be documented.

1.6 Acronyms and Definitions

Terms used in the HASP, are as follows:

ACGIH - American Conference of Governmental Industrial Hygienists

Authorized Personnel - Any person, including task-specific personnel, project personnel, oversight personnel, contractors and consultants whose presence is authorized.

Breathing Zone - The worker's breathing zone is an imaginary zone of two foot radius surrounding the head.

Contamination-Reduction Zone - The area designated for removal of contaminants from personnel and equipment. This area is adjacent to the Exclusion Zone.

Contractor/Consultant - Any person or firm, retained or hired by the 216 Paterson Plan Road Cooperating PRP Group and/or their contractors, to carry out and/or supervise any portion of the activities conducted at the Site.

Exclusion Zone - The area to which all personnel entering must be directly involved in the ongoing work, have designated personal protective equipment (PPE), and meet training and medical monitoring requirements. The Exclusion Zone will be defined by an approximate 25-foot radius around the work area, which will be suitably marked.

HASP - Health and Safety Plan

HSO - Health and Safety Officer

IDLH - Immediate Danger to Life and Health

MSDS - Material Safety Data Sheets, which provide information on the physical, chemical, and hazardous properties of chemical compounds.

NIOSH - National Institute of Occupational Safety and Health

On-Property - The 216 Paterson Plank Road facility actively controlled by the Cooperating PRP Group.

Off-Property - Areas not owned and/or controlled by the Cooperating PRP Group.

OSHA - Occupational Safety and Health Administration

Oversight Personnel - Any person, designated by the state or federal government, who is assigned to carry out oversight work.

PEL - Permissible Exposure Limit

PPE - Personal Protective Equipment

PPM - Parts per million; expressed as ppm(v) for gases and vapors.

Potential Source Area - The areas designated by the USEPA as areas of potential contamination and, if necessary, posted by signs with "Authorized Trained Personnel Only".

REL - Recommended Exposure Limit

SAMP - Sampling Analysis and Monitoring Plan

Site - The 216 Paterson Plank Road Superfund Site

Support Zone - The area outside the Exclusion Zone that is considered clean for the purpose of the HASP. It is used for transfer of equipment and materials into the work site (i.e., support) and providing communications between the various zones.

TLV - Threshold Limit Value

2.0 HAZARD EVALUATION

Potential Site hazards include chemical hazards, physical hazards, and biological hazards. Each of these groups of potential hazards is addressed below.

2.1 Potential Chemical Hazards

Results of past sampling activities at the Site indicate that there has been chemical contamination of the soil and groundwater. Table C-1 summarizes the potentially hazardous chemicals of concern found on Site in the previous Remedial Investigation activities[1]. Table C-2 summarizes airborne exposure limits for these chemical contaminants. The chemical hazard associated with the reported chemical concentrations in the groundwater and soil is toxicity. Potential hazards include:

(1) Inhalation of organic vapors due to the presence of volatile organic compounds (VOCs) in the soil and groundwater.

(2) Inadvertent ingestion of potentially toxic substances via hand to mouth contact or deliberate ingestion of materials inadvertently contaminated with potentially toxic materials. Included in this list are VOCs, semi-volatiles, pesticides, PCBs and inorganic compounds.

(3) Dermal exposure and possible percutaneous (skin) absorption of certain lipophilic (readily absorbed through the skin) organic chemicals including benzene.

Exposure via the ingestion route can be controlled effectively by the means of good personal hygiene habits, and prohibition of smoking, eating, drinking and chewing in contaminated areas. Similarly, dermal exposure can be eliminated by good personal hygiene and appropriate clothing. Inhalation hazards are addressed in Section 4.3 below.

2.2 Potential Physical Hazards

2.2.1 Heat Stress

Working in protective clothing can greatly increase the likelihood of developing heat stress. This can result in health effects ranging from transient heat fatigue to serious illness or death. The

[1] An investigation of the "hot spot" sludge area was completed in 1997. The sludge material, as shown on Figure B1 of the SAP/QAPP includes the highest VOC and PCB concentrations detected anywhere on the Site. Data from this investigation has not been included since the work that will be completed under this HASP will be completed outside the "hot spot" sludge area and within soils that are located on the outboard side of the existing slurry wall.

signs and symptoms of heat stress are presented in Section 2.4. Workers shall monitor themselves and others for signs of heat stress when ambient temperatures exceed 80 degrees Fahrenheit (70 degrees when wearing Tyvek coveralls).

2.2.2 Cold Stress

Personnel exposed to cold temperatures (especially during windy conditions) may be subjected to cold stress in the form of frost nip, frost bite or hypothermia. Signs and symptoms of cold stress are described in Section 2.4. Workers shall monitor themselves and others for signs of frost nip when cold weather occurs. Extra caution will be exercised when working in windy conditions and/or when clothing becomes wet.

2.2.3 Confined Space/Test Pit Hazards

No confined space work is anticipated. Should such work become necessary, a Confined Space Entry Permit will be completed and an addendum to this HASP will be prepared.

2.2.4 Other Physical Hazards

All Site employees must take note of physical hazards which are identified during site safety briefings. These hazards include, but are not limited to: steep slopes, soft sediments, muck, and the creek (trips, falls, and drowning); sharp debris (puncture wound); overhead utilities, public traffic and slippery and/or congested walking surfaces (falls). Orange vests will be worn when working near public rights-of-way. Work areas such as borings must be delineated using high visibility caution tape.

During drilling activities no more than two lengths of drill rod may extend above the top of the rig derrick at any time.

Field personnel must be alert to the hazards associated with site vehicles, drill rig operation, heavy equipment, and powered hand-held equipment operations. These hazards include noise, crushing injuries, overhead hazards, and pinch points. Personnel must be alert to weather-related hazards (e.g., lightning) or the possibility of increased hazard due to weather (e.g., slipping on mud or ice).

2.3 Potential Biological Hazards

Contact with waste materials can lead to infected cuts. Personnel shall follow the guidelines in Section 1.4 and follow first aid procedures for disinfection of cuts and abrasions.

The Site area may contain ticks which can transmit Rocky Mountain Spotted Fever and Lyme Disease. During tick season (March to November), Site employees will check for ticks. Light colored clothing should be worn and any openings (shirt and pant cuffs) should be secured to inhibit tick movement from clothing to skin. The use of insect repellents should be considered if its use will not interfere with sampling activities. Personnel must check with their Project Manager before using repellents. Field personnel will acquaint themselves with the symptoms of tick-borne diseases detailed below and will contact a physician as well as the Health and Safety Officer if a disease is suspected.

The Site area may also harbor potentially harmful snakes. Personnel must be alert to these reptiles.

The Site area may contain poison ivy which can be recognized by an oily sheen on the leaf and/or three leaflets together or similar vegetation. The active substances can be transmitted by direct skin contact and via contact with contaminated clothing.

2.4 Signs and Symptoms of Exposure

2.4.1 Chemical Exposure

The health effects associated with the chemical contaminants at the site are varied. Personnel who experience any of the following symptoms should report the occurrence to the Health and Safety Coordinator promptly:

- Skin, eye, or respiratory system irritations;
- Skin rashes/burns;
- Headaches, dizziness;
- Nausea/GI tract problems;
- Muscle spasms/tremors;
- Chills; and/or,
- Fatigue.

Note that the above symptoms are not necessarily caused by chemical exposure. Any serious medical problem should be promptly referred to professional medical care. If personnel experience any of the above symptoms, the Health and Safety Coordinator shall evacuate the area (upwind if possible) if necessary and evaluate affected personnel for signs and symptoms of exposure. Appropriate first aid measures shall be taken. The activity will not resume until the atmospheric conditions are evaluated using monitoring instruments by personnel wearing Level C (or B, if Level C was utilized when the incident occurred) Personal Protective Equipment. Atmospheric conditions will be evaluated by monitoring for concentrations of combustible gases, VOCs, H_2S, and HCN as described in Section 3.

2.4.2 Physical Exposure

The signs of heat stress are as follows:

- Heat rash may result from continuous exposure to heat or humid air.
- Heat cramps caused by heavy sweating with inadequate electrolyte replacement. Signs and symptoms include:
  - muscle spasms; and
  - pain in hands, feet, and abdomen.

Heat exhaustion from increased stress on various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration. Signs and symptoms include:

- Pale, cool, moist skin;
- Heavy sweating;
- Dizziness;
- Nausea; and
- Fainting.

Heat stroke is the most serious form of heat stress. Temperature regulation fails and the body temperature rises to critical levels. Immediate action must be taken to cool the body before serious injury and death occur. Competent medical help must be obtained. Signs and symptoms are:

- Red, hot, usually dry skin;
- Lack of or reduced perspiration;
- Nausea;
- Dizziness and confusion;
- Strong, rapid pulse; and
- Coma.

Working in protective clothing can greatly increase the likelihood of heat fatigue, heat exhaustion, and heat stroke, the latter being a life threatening condition. When working in ambient temperatures greater than 80°F (70°F when in Level B equipment), employees shall use the 'buddy system' to monitor each other's pulse rate at the start of each rest period. A rest period shall consist of a continuous time period of at least five (5) minutes preferably in a shaded area. The personnel will not be assigned to other work during this rest period. If the pulse rate exceeds 110 beats per minute, the employee shall take his or her oral temperature with a clean disposable calorimetric oral thermometer. If the oral temperature exceeds 99.6°F, the next work period shall be shortened by one third. The pulse rate and oral temperature shall be monitored again at the beginning of the next rest period; and if the oral temperature exceeds 99.6°F, the work period shall again be shortened by one third, etc., until the oral temperature is below 99.6°F.

All employees are to be alert to the possibility and symptoms of heat stress. If heat stress is suspected the employee will leave the work area, rest, cool off, and drink plenty of cool water/Gatorade/Squelcher or equivalent. Sufficient cool potable water and clean disposable cups shall be maintained at all times on-site. If the symptoms do not subside after a reasonable rest period, the employee shall notify the on-site Health and Safety Coordinator and seek medical assistance.

Signs of cold stress include yellow or white patches of skin on the fingertips, nose and ears. These areas will be numb. The affected parts will be rewarmed gently and the patient will not return to work until additional protection (e.g., gloves, hard hat liner) is obtained. It is essential to prevent frost bite as the person may become susceptible to future cold-related medical problems. Personnel are encouraged to change into dry socks after the lunch break as perspiration held by the socks prompts cooling of the feet. Should clothing become wet, it is imperative that the person change into dry clothes before resuming work. Wet clothing can lead to hypothermia. Symptoms of hypothermia include uncontrollable shivering, decreased physical and mental capabilities, and lowered body temperature. Persons exhibiting symptoms of cold stress or hypothermia will not return to work without the approval of the site Health and Safety Coordinator.

2.4.3 Biological Exposure

Symptoms of Rocky Mountain Spotted Fever include fever chills, headache, abdominal, muscle pain, and nausea. A red rash develops at the wrist and ankles two to five days after exposure. Symptoms develop two to fourteen days after exposure.

Symptoms of Lyme Disease include fatigue, stiffness (particularly in the neck). There may be a red circular rash. Fever may be present. Symptoms develop a few days to two years after exposure.

Personnel exhibiting symptoms of Rocky Mountain Spotted Fever or Lyme Disease should consult a medical professional immediately.

Personnel bitten by a snake will immediately clean the wound and proceed to the hospital for medical evaluation.

Skin-sensitizing (poisonous) vegetation produces a bumpy, swollen rash at the point of contact. This rash is easily spread if the oil gets on the fingers. Wash affected area(s) including tools, as soon as possible. Use over-the-counter medications to reduce the irritation. Avoid scratching the rash. Cover the affected area(s) with clean dressings. Severe exposure may necessitate evaluation by a medical professional.

2.5 Task Risk Analysis

Table C-3 presents a comparative risk analysis based on anticipated field activities and hazards. All personnel will be aware that specific hazards and the associated potential severity may be influenced by weather, season, and fatigue.

3.0 SITE MONITORING AND ACTION LEVELS

Air monitoring is required during intrusive tasks. The requirements for air monitoring and associated action levels for each site activity are detailed in Table C-4. The monitoring methods involved and their interpretation are discussed in the following sections. Intrusive activities have the potential for exposures to VOCs and a slight possibility of explosive concentrations of various gases.

Past air monitoring conducted on-site has indicated that no VOC concentrations approached the Action Level for the particular chemicals, with the exception of work conducted within the "hot-spot area" sludge area (refer to Figure B1 of the SAP/QAPP). All observed concentrations were less than the 8-hour ACGIH TLV inhalation standards for the VOCs detected at the Site. Routine air monitoring is therefore not required during non-intrusive activities.

3.1 Combustible Gases

Chemical waste sites may contain explosive concentrations of non-methane gases. Underground utility lines could be damaged or weakened such that explosive gases are released. Digging or drilling (including hand augering) into such an area can pose a fire and explosion hazard.

An MSA Model 361 oxygen, combustible gas, and hydrogen sulfide detector, or an equivalent direct reading instrument, will be used to monitor combustible gas concentrations during appropriate tasks as defined in Table C-4. The instrument calibration must be checked daily. The MSA 361 is factory calibrated to pentane.

The LEL concentration (the lowest concentration at which a gas becomes explosive in air) is typically between 1 percent and 7 percent for most "combustible" organic vapors and gases. This corresponds to a concentration of 10,000 to 70,000 parts per million (ppm) by volume in air. The LEL concentration of methane for example is 5% or 50,000 ppm in air. Consequently, 50% LEL of methane is equivalent to 25,000 ppm. At such concentrations most flammable gases can be detected by the sense of smell. However, methane and hydrogen are notable exceptions.

During drilling operations, the MSA 361 probe shall be lowered into the borehole or casing whenever it is convenient, but at least at five foot drilling intervals or once per hour, whichever is

more frequent. Both combustible gas concentrations and oxygen concentrations will be determined in the borehole, at the borehole mouth and in the workers' breathing zone. Do not lower the probe into water. Use the in-line water trap when working around liquids.

No open flames, matches, cigarette lighters, or fires of any kind shall be allowed in the vicinity of the drilling operations. If the elevated levels are due to a localized pocket of gas, levels may drop and drilling can proceed, with caution and vigilant monitoring. If levels increase, the hole may be purged with carbon dioxide gas (which is heavier than air), or solid CO_2 (dry ice). If subsequent combustible gas levels at the surface and combustible gas/oxygen levels at depth no longer indicate the presence of an explosion hazard, work may continue with frequent monitoring and extreme caution. If explosive gas levels exceed 20% LEL beyond the mouth of the hole, work should be halted pending discussion with health and safety personnel.

Combustible gas levels must always be determined prior to any welding on casing or in the vicinity of the borehole. Readings should be taken at depth, at the mouth of the casing, and around the outside of the casing at ground level. Readings in excess of 20% LEL indicate the need for an inflatable bladder to isolate the borehole atmosphere from any potential ignition sources. The bladder is inserted into the well casing below the weld, inflated, and covered with water to ensure a gas-tight fit. When welding is completed, the bladder is deflated and removed. Should explosive gas in excess of 20% LEL be detected in the casing annulus, work will temporarily cease, ignition sources will be secured and the Project Manager will be contacted. If the condition does not subside, engineering controls will be established. These controls will be situation dependent and will be tested for effectiveness before welding occurs.

It may not be appropriate to designate a single "cease operations" action level for combustible gases encountered during drilling operations. The Site Health and Safety Coordinator must be sufficiently knowledgeable to assess the situation taking into account all of the factors discussed above. As a general rule, however, any readings greater than 20% LEL at depth are cause for increased monitoring activity. Readings greater than 50% LEL in the presence of oxygen concentrations greater than 12 percent require extreme caution, increased vigilance, and a careful assessment of overall conditions as discussed above. In the presence of combustible gas levels greater than 20% LEL a foot or so above the mouth of the hole or casing, the Site Health and Safety Coordinator should temporarily cease operations and carefully assess the situation.

Conditions may call for preventative or corrective measures, such as purging the hole using carbon dioxide or general site ventilation.

3.2 Hydrogen Sulfide

Hydrogen sulfide concentrations may be monitored on the MSA 361 directly in ppm, concurrently with combustible gas measurements. Calibration of the hydrogen sulfide detector must be checked prior to each day of use by introducing a 10 ppm (or 40 ppm) H_2S calibration gas. Instrument readings should be 9-11 ppm or 36-44 ppm, respectively.

The eight hour time weighted average threshold limit value (TLV) for H_2S is 10 ppm and the 15 minute short term exposure limit (STEL) is 15 ppm. The immediately dangerous to life and health (IDLH) level is 100 ppm.

If H_2S concentrations greater than 10 ppm are detected at the mouth of the borehole, the monitoring frequency shall be increased and/or the MSA 361 can be set up to run continuously at the driller's operating position.

At concentrations of a few ppm in the breathing zone, the odor nuisance would be such that site personnel would probably voluntarily don air purifying respirators. Such use of air purifying respirators is appropriate if H_2S concentrations are being monitored continuously.

If concentrations in the breathing zone exceed 10 ppm for more than an hour, 15 ppm for more than 15 minutes, or at any time exceed 25 ppm, work shall be temporarily halted until H_2S levels subside, engineering controls are implemented or until Site personnel are equipped with pressure demand air supplying respirators. The Health and Safety Officer must be advised of such conditions and approve the revised procedures prior to implementation.

3.3 VOC Monitoring

Volatile organics that are of most concern from an inhalation standpoint are those that are moderately to highly toxic and have odor thresholds higher than their corresponding TLV. Tetrachloroethylene, benzene and trichloroethylene fall into this category.

The designated Site Heath and Safety Coordinator shall have on-site at all times during intrusive activities a Photo-Ionization Detector (PID) meter. Calibration of the instrument must be checked daily prior to each day of use by introducing a known concentration of isobutylene gas in accordance with the manufacturer's instructions. Background levels must be established well upwind of any excavation, borehole, spoils pile, etc. The Health and Safety Coordinator shall monitor the borehole and employee breathing zone at least every 15 minutes, or whenever there is any indication that concentrations may have changed (odors, visible gases, appearance of drill cuttings, etc.) since the last measurement. If the exact nature of the contaminant(s) is unknown, any consistent readings >1 ppm in the breathing zone (above background level) for more than five minutes, or any readings in the breathing zone greater than 10 ppm above background level other than a momentary peak or any peak >25 ppm above background level shall be the action level for donning air purifying respirators equipped with HEPA/organic vapor acid gas cartridges. The Health and Safety Officer must be advised of such conditions and approve the revised procedures. Prolonged concentrations above 25 ppm above background levels or numerous peaks will be evaluated by the Health and Safety Officer and Project Manager for upgrading to Level "B" respiratory protection.

Given the rapid "break through" time of some substances, cartridges will be replaced after each day of use or immediately upon an indication of "break through" (perceptible odors inside of the mask), whichever is less. High humidity situations (>80% relative humidity) may require cartridge replacement at a more frequent rate (every 4 hours).

Engineering controls such as additional ventilation may be used in place of respiratory protection if it is demonstrated through monitoring that the engineering controls are effective in reducing airborne concentrations.

3.4 Nuisance Dust, Pesticides, PCBs and Metals Monitoring

Nuisance dust, pesticides, PCBs and metals have the potential for becoming a problem during disruptive or intrusive activities such as drilling. The specific metal concentrations are variable through the site. Activities that generate dust will require engineering controls (e.g., water misting of the air and surrounding soil) before and during the activities. Should engineering controls be ineffective as evidenced by chronic visible airborne dust, Level C respiratory protection will be utilized, real time aerosol monitoring using an MIE PDM-3 miniram or

equivalent will be conducted and the airborne metal concentration will be estimated using prior worst case soil concentration data for metals. The MIE PDM-3 miniram is factory calibrated by the vendor prior to field use.

4.0 ON-SITE CONTROL

4.1 Site Communication System

Personnel will operate using the "buddy system". Each individual shall maintain visual/aural contact with another individual or group at all times. If more than one group is working at the Site and the groups are not within visual/aural communication range, two-way radios may be necessary to maintain communications.

4.2 Site Safety Zone and Access Control

No on-site safety zones are required for non-intrusive activities. During intrusive activities (e.g. drilling), an Exclusion Zone will be established by the site personnel. The Exclusion Zone will generally be a 25 foot radius from the boreholes. Monitoring will be periodically conducted at the downwind perimeters to assure that the concentrations are similar to background concentrations. If perimeter concentrations are greater than background concentrations for more than five minutes, the downwind perimeter shall be extended, where practical, or engineering controls will be implemented such that downwind and background concentrations are similar. Exposed materials such as cuttings will be contained or covered and perimeter monitoring will continue until ambient air concentrations upwind and downwind of the Exclusion Zone are equal. The limits of the Exclusion Zone will be marked with high visibility flagging tape or four or more traffic cones or similar devices.

The Exclusion Zone will be accessed through a marked Contamination Reduction Zone (CRZ). The CRZ shall be used for gross decontamination of both personnel and equipment items. It shall be configured to allow the decontamination of the field crew while upwind of the Exclusion Zone. The Site Health and Safety Coordinator or his designee will assure that all personnel entering the Exclusion Zone wear the required protective equipment and that upgraded level of protection equipment is readily available.

As work activities will be conducted throughout the Site and off-property, a centralized decontamination facility will be used for the full decontamination of drilling and sampling equipment and personnel.

All decontamination materials and liquids from all areas will be properly collected and will be secured in a fenced storage area until proper disposal occurs.

4.3 Personal Protective Clothing and Respiratory Protection

The following scheme will be used to designate the required level(s) of personal protective equipment and respiratory protection: the alphabetical designations "B," "C," and "D" shall refer specifically to levels of respiratory protection, namely pressure-demand air supplying respirators with escape provisions, air purifying respirators, and no respiratory protection, respectively. Since potential dermal exposure hazards may require a wide variety of personal protective clothing without regard to the required level of respiratory protection, the numerical designations "1," "2," and "3" will be used to specify the level of protective clothing that is to be employed in addition to the designated level of respiratory protection as described below (i.e., the level of protective equipment can be completely defined by a designation of "C-2," "B-1," etc.). The required levels of protective equipment and upgrade criteria for each work task are specified in Table C-4. All equipment and clothing shall be inspected by the wearer prior to use. All suspect protective equipment will be rejected and disposed of as non-contaminated waste. Protective equipment levels are described below:

LEVEL D1 PROTECTIVE CLOTHING

1. Standard work clothes (long pants and sleeved shirt);
2. Steel toed boots;
3. Safety glasses;
4. Orange safety vests (when working near public traffic);
5. Hard hats (when an overhead hazard is possible) and;
6. Hearing protection (during drilling and other noise producing activities).

Upgraded protective clothing shall consist of the following:

LEVEL D1, MODIFIED PROTECTIVE CLOTHING

1. Level D1 protective clothing;
2. Liner latex gloves; and
3. Outer NBR gloves.

LEVEL D2, PROTECTIVE CLOTHING

1. Level D1 protective clothing;
2. Inner latex gloves;
3. Outer NBR gloves;

4. Polycoated Tyvec® suits; and,
5. Chemical protective boots

LEVEL C PROTECTIVE CLOTHING

1. Level D2 protective clothing;
2. Full Face air-purifying respirator

LEVEL B PROTECTIVE CLOTHING

1. Level D2 protective clothing;
2. Supplied air (open or closed circuit)

Polycoated Tyvek will be worn where it is probable that there will be contact with subsurface soils, groundwater and/or surface water containing PCBs and/or pesticides. Polycoated Tyvek will also be worn when working in muddy conditions.

If conditions are found which are beyond the required Level(s) of Protection, personnel are to leave the area immediately and obtain the required protective equipment. Should the personnel suspect an inhalation hazard (e.g. unusual and continuous odors, dizziness, or respiratory irritation), they are to immediately move upwind from the area and promptly notify the Health and Safety Coordinator. Work will not proceed in these areas until the nature of the hazard has been assessed by air monitoring and additional protective measures are employed to the satisfaction of the Site Health and Safety Coordinator. Re-entry will be from an upwind position (when possible). Monitoring will proceed re-entry. Personnel who experienced symptoms will not re-enter the area until symptoms have subsided and additional equipment/precautions are employed as determined by the monitoring. An examination by a physician may be prudent depending on the symptoms and duration.

4.4 Decontamination

Decontamination will involve two phases. Gross decontamination of personnel and equipment, comprising removal of mud by dry brushing or scraping, will take place in the Contamination Reduction Zone established at the site of each intrusive activity. All soil removed in this way will be backfilled into the borehole or test pit or collected and secured in a fenced storage area. All personnel and equipment will undergo gross decontamination prior to moving to a new investigation location on the Site. Prior to leaving the Site, personnel and equipment will undergo full decontamination at the central decontamination pad. Where appropriate to avoid

possible cross contamination, (for example between soil borings) full decontamination, by steam cleaning, of drilling tools will also take place between investigation locations. The location of the decontamination pad is shown on Figure B1 of the SAP/QAPP.

Decontamination Procedures

All personnel involved in intrusive activities and/or contaminated personnel shall decontaminate prior to leaving the site. The Decontamination Pad area shall have plastic sheeting on the ground of sufficient size to contain the personnel, hand held equipment and decontamination materials required. A typical Decontamination Area will require:

- 2 wash tubs (1 wash, 1 rinse);
- Several scrub brushes;
- Disposable towels and plastic bags;
- Seating to facilitate boot removal;
- Decontamination solution (e.g. Alconox);
- Duct tape;
- Hand soap; and,
- Skin wash water source

Personnel will follow the decontamination procedure below. At a minimum all personnel will wash their hands and face prior to eating, smoking or leaving the Site. The Site Health and Safety Coordinator shall inspect personnel and non-disposable protective equipment for cleanliness prior to release from the Site.

Station 1: Equipment Drop
Deposit equipment used on-site (hand tools, sampling devices and containers, monitoring instruments, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool down station may be set up within this area.

Station 2: Outer Garment, Boots, and Gloves Wash and Rinse
Scrub boots, outer gloves and splash garments (if worn) with decon solution. Rinse off with water.

Station 3: Outer Glove Removal
Remove outer gloves. Deposit in container with plastic liner.

Station 4: Cartridge or Respirator Change (if applicable)
If worker leaves exclusion zone to change cartridges (or respirator), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves donned, joints taped, and worker returns to duty.

Station 5: Boot, Gloves and Inner Garment Removal (if applicable)
Boots, protective suit, inner gloves removed and deposited in disposal containers.

Station 6: Respirator Removal (if applicable)
Respirator is removed. Avoid touching face with fingers, respirator deposited on plastic sheet.

Station 7: Field Wash
Hands and face are thoroughly washed. Shower as soon as possible.

Monitoring equipment and hand tools shall be retrieved and decontaminated using methods appropriate for the type of equipment. Containing equipment in plastic (as applicable) prior to site entry will expedite decontamination. The Health and Safety Coordinator shall inspect the equipment for cleanliness.

All chemicals brought to the Site will have the appropriate Material Safety Data Sheet(s) (MSDS) provided to the Health and Safety Coordinator. This requirement also applies to drilling materials.

All disposable personal protective equipment will be double bagged in plastic bags and disposed of as municipal wastes. All decontamination materials will be drummed in 55-gallon drums. The solids and liquids will be separated. The liquids will be subsequently disposed into the on-site 10,000 gallon holding tank and the solids will be properly disposed as Investigation Derived Waste.

Drill rigs and excavation equipment decontamination will follow the methods described in the SAP/QAPP.

5.0 CONTINGENCY AND EMERGENCY RESPONSE PLANS

If an unanticipated, potentially hazardous situation arises as indicated by visible contamination, unusual or excessive odors, Site personnel shall temporarily cease operations, move away to a safe area, and contact the Site Health and Safety Coordinator. The following procedures have been established to deal with emergency situations that might occur during Site and off-property activities. Prior to starting work at the Site, the local emergency response services will be contacted and informed that field activities will be in progress. Site personnel will familiarize themselves with the location of the nearest phones and medical facilities on arrival at the Site. In the event of a serious emergency situation (e.g. medical problems beyond routine first aid, explosive gas concentrations, or fire beyond incipient stage), Site personnel shall contact the Carlstadt Police Department, inform them of the nature of the emergency, and then notify Golder Associates Health and Safety personnel. When help arrives, Site personnel shall defer all emergency response authority to appropriate responding agency personnel. Emergency notification information is summarized in Attachment C4 of this document.

Carlstadt is served by local police, medical and fire services and is able to provide first response to all emergencies which might occur at the Site or off-property.

5.1 Medical Emergency Response Plan

The nature of chemical contamination on this project is not anticipated to present an immediate threat to human health. Other than removal of outer protective garments and gross contamination (e.g., mud), immediate emergency treatment of injuries should therefore generally take precedence over personal decontamination.

Should any person on the Site be injured or become ill, initiate the following emergency response plan and notify the on-Site Health and Safety Coordinator and Personnel Department as soon as possible:

1. If able, the injured person should proceed to the nearest available source of first aid. If the injured party is extremely muddy, remove outer garments and if necessary, wash the injured area with soap and water. If the "injury" involves a potential overexposure to hazardous gases or vapors, (headache, dizziness, nausea, disorientation), get the victim to fresh air and take him or her to the Meadowlands Hospital, Meadowlands Parkway, Secaucus, New Jersey, (see Figure C1) telephone (201) 392-3100, for a complete physical examination as soon as possible.

If the injury involves foreign material in the eyes, immediately flush the eyes with emergency eye wash solution and/or rinse with copious amounts of potable water. Obtain or administer first aid as required. If further medical treatment is required, seek professional medical assistance as discussed below.

Appropriate measures should be taken to protect the privacy of workers in connection with putting on and taking off of protective clothing.

First aid providers shall wear latex gloves when providing any first aid. Severe injuries involving large quantities of blood require that first aid providers don Tyvek coveralls and safety glasses in addition to gloves.

2. If the victim is unconscious or unable to move, or if there is any evidence of spinal injury, do not move the injured person unless absolutely necessary to save his or her life, until the nature of the injury has been determined. Administer rescue breathing using a CPR barrier if the victim is not breathing, control severe bleeding and immediately seek medical assistance as discussed below.

3. If further medical treatment is required and

   a. the injury is not severe, contact Meadowlands Hospital (201) 392-3100 and take the injured party to the hospital by private automobile.

      Directions to the Hospital:
      From the Gotham Parkway and Paterson Plank Road, turn left onto Paterson Plank Road.
      At the "y" in the road take Route 3 east, toward the Lincoln Tunnel
      Follow Route 3 across the Hackensack River Bridge and stay in the right lane following the blue "H" hospital signs.
      Take the ramp at the end of the bridge and make a left onto Meadowlands Parkway
      Continue on this road for 4 traffic lights, the hospital is at the fourth light on the right side.

   b. the injury is severe, immediately call Carlstadt Police Department at (201) 438-4300 or 911 using a standard phone.

   In both cases, if decontamination is not undertaken, appropriate precautions should be taken to avoid transfer of contaminants to vehicles and other facilities. This can be done by using plastic sheeting or the exposure blanket contained in the first aid kit.

4. Any injured person taken to the hospital shall be accompanied by an individual designated by the Site Health and Safety Coordinator to ensure prompt and proper medical attention. After proper medical treatment has been obtained, the designated companion should notify the Health and Safety Officer and prepare a written report. Site personnel shall maintain their medical insurance identification at the Site whenever they are on Site.

In the event that any personnel are injured at the site during any phase of the Investigation, all available technical information and supporting documentation shall be provided to any treating physicians, or treating health care workers or facilities.

5.2 Fire and Explosions

Dry chemical fire extinguishers are effective for fires involving ordinary combustibles such as wood, grass, flammable liquids, and electrical equipment. They are appropriate for small, localized fires such as a drum of burning refuse, a small burning gasoline spill, a vehicle engine fire, etc. No attempt should be made to use these extinguisher for well established fires or large areas or volumes of flammable liquids.

In the case of fire, prevention is the best contingency plan. There will be no smoking on Site except in pre-designated areas. In the event of a fire during drilling or well installation, personnel shall attempt to extinguish the fire with on-site fire extinguishers. If a fire cannot be controlled in this manner, personnel shall notify the Site Health and Safety Coordinator and follow the procedure outlined below.

Catalytic converters on the underside of vehicles are sufficiently hot to ignite dry grass. Personnel should avoid driving over dry grass that is higher than the ground clearance of the vehicle, and be aware of the potential fire hazard posed by the catalytic converter, at all times. Never allow a running vehicle to sit in a stationary position over dry grass or other combustible materials.

1. In the event of a fire or explosion:
2. If the situation can be readily controlled with available resources without jeopardizing the health and safety of Site personnel, take immediate action to do so. If not:
3. Isolate the fire to prevent spreading, if possible.
4. Clear the area of all personnel working in the immediate vicinity.
5. Immediately notify site emergency personnel and the Carlstadt Fire Department. (201) 438-4300 or 911 using a standard phone.

5.3 Chemical Exposure First Aid

In an event of exposure to chemicals through inhalation:

1. Move the victim to an up-wind location for fresh air.
2. Signal for help.
3. Initiate CPR to revive the victim, if necessary.
4. Contact Carlstadt Police Department, if necessary.

For exposure through dermal route (including eyes):

1. Wash the affected area with copious fluids for at least fifteen (15) minutes (Signal for help if necessary).
2. If irritation persists, seek professional medical care.

For ingestion:

1. Drink a large amount of water to dilute the contaminant(s).
2. Transport the victim to the hospital. Take a copy of this HASP to the hospital.

If decontamination is not undertaken prior to transporting the victim to the hospital, appropriate precautions should be taken to avoid transfer of contaminants to vehicles and other facilities.

5.4 Unforeseen Circumstances

The health and safety procedures specified in this plan are based on the best information available at the time. Unknown conditions may exist, and known conditions may change. This plan cannot account for every unknown or anticipate every contingency. Should personnel suspect or encounter areas of substantially higher levels of contamination, or should any situation arise which is obviously beyond the scope of the safety procedures specified herein, work activities shall be modified (such as by moving to another location) or halted pending discussions with the Health and Safety Officer and implementation of appropriate protective measures.

5.5 Accident and Incident Reports

If an incident or accident occurs, the Health and Safety Officer and Project Manager shall be notified and the Incident Report (shown in Attachment C-5) shall be completed. The report shall be completed by an eye witnesses (if possible) along with assistance from the Site Health and Safety Coordinator. The report will be forwarded to the Health and Safety Officer as soon as possible for further investigation or follow up.

5.6 Emergency Contacts

Emergency notification information is summarized in Attachment C-4 of this document.

Table C1
Maximum Chemical Constituent Values
216 Paterson Plank Road Site

Chemical	Water Table Groundwater, ppb	Shallow Soils, ppb
aldrin	NR	57,000
arsenic	1,600	60,000
benzene	7,270	53,900
cyanide	NR	NR
dieldrin	NR	57,000
hydrogen sulfide	NR	NR
lead	1,500	2,750
methane	NR	NR
PAH, fluoranthrene	266	15,300
PAH, phenanthrene	11	23,600
PAH, pyrene	228	12,700
PCBs	17,000*	1,5083,000*
tetrachloroethylene	24,500	4,290,000
trichloroethene	161,000	2,060,000

Notes:
NR: Not Reported
ppb: parts per billion
"*": total for all PCBs

Reference: FInal RI Report (1990)

Table C2
Airborne Exposure Limit Information
216 Paterson Plank Road Site

Chemical	OSHA PEL	NIOSH REL	ACGIH TLV	IDLH	Ionization Potential, eVolts	PID Meter Response Factor	Odor Threshold, ppm
aldrin	0.250 mg/m3 Ca	0.250 mg/m3 Ca	0.25 mg/m3	100 mg/kg Ca	NR	NR	--
arsenic	0.010 .mg/m3	0.002 mg/m3 Ca	0.01 mg/m3	5 mg/m3 Ca	NA	NA	--
benzene	1 ppm	0.1 ppm Ca	10 ppm	500 ppm Ca	9.24	0.6	34 - 119
cyanide (HCN)	4.7 ppm short term	4.7 ppm short term	10 ppm ceiling	50 ppm	13.9	NR	0.1 - 5.0
dieldrin	0.250 mg/m3	0.250 mg/m3 Ca	0.25 mg/m3	50 mg/m3 Ca	NR	NR	--
hydrogen sulfide	20 ppm	10 ppm C	10 ppm	100 ppm	10.46	NR	0.001 - 0.13
lead	0.05 mg/m3	0.1 mg/m3	0.15 mg/m3	100 mg/m3	NA	NA	--
methane	NE	NE	NE	5% (LEL)	13	NR	odorless
PAH, fluoranthrene	0.2 mg/m3	0.1 mg/m3	0.2 mg/m3	700 mg/m3 Ca	varies	NR	--
PAH, phenanthrene	0.2 mg/m3	0.1 mg/m3	0.2 mg/m3	700 mg/m3 Ca	varies	NR	--
PAH, pyrene	0.2 mg/m3	0.1 mg/m3	0.2 mg/m3	700 mg/m3 Ca	varies	NR	--
PCBs, 54% chlorine	0.5 mg/m3 skin	0.001 mg/m3	0.5 mg/m3	5 mg/m3, Ca	unknown	unknown	--
tetrachloroethylene	100 ppm	minimize Ca	25 ppm	150 ppm, Ca	9.32	NR	47
trichloroethene	100 ppm	25 ppm Ca	50 ppm	1000 ppm Ca	9.45	0.6	82

OSHA PEL: Occupational Safety and Health Adminstration Permissable Exposure Limit
NIOSH REL: National Institute of Occupational Safety and Health Recommended Exposure Limit
ACGIH TLV: American Conference of Governmental Industrial Hygienists Threshold Limit Value
IDLH: Immediately Dangerous to Life or Health
ppm: parts per million
Ca: carcinogen
lowest feasible: reduce exposure to lowest feasible concentration
minimize: minimize exposure
mg/m3: milligrams per cubic meter
mg/kg: milligrams per kilogram of body weight (Sax)
NE: Not Established
NA: Not Applicable
NR: Not Reported
"--": not available

Table C3
Task/Risk Analysis
216 Paterson Plank Road Site

This table details site activities and anticipated associated risks by class: Biological, Chemical, or Physical. Personal Protective Equipment level, weather, air temperature and season may effect the magnitude of some types of risk. Site personnel shall use prudent judgement at all times.

Task/Activity	Hazard		
	Biological	Chemical	Physical
Walk Through	L	L	L
Drilling	L	M	M

Many of the chemicals identified in the on site media can enter through the skin. This route of entry must be protected whenever skin contact is probable.

L: Low
M: Moderate
H: high

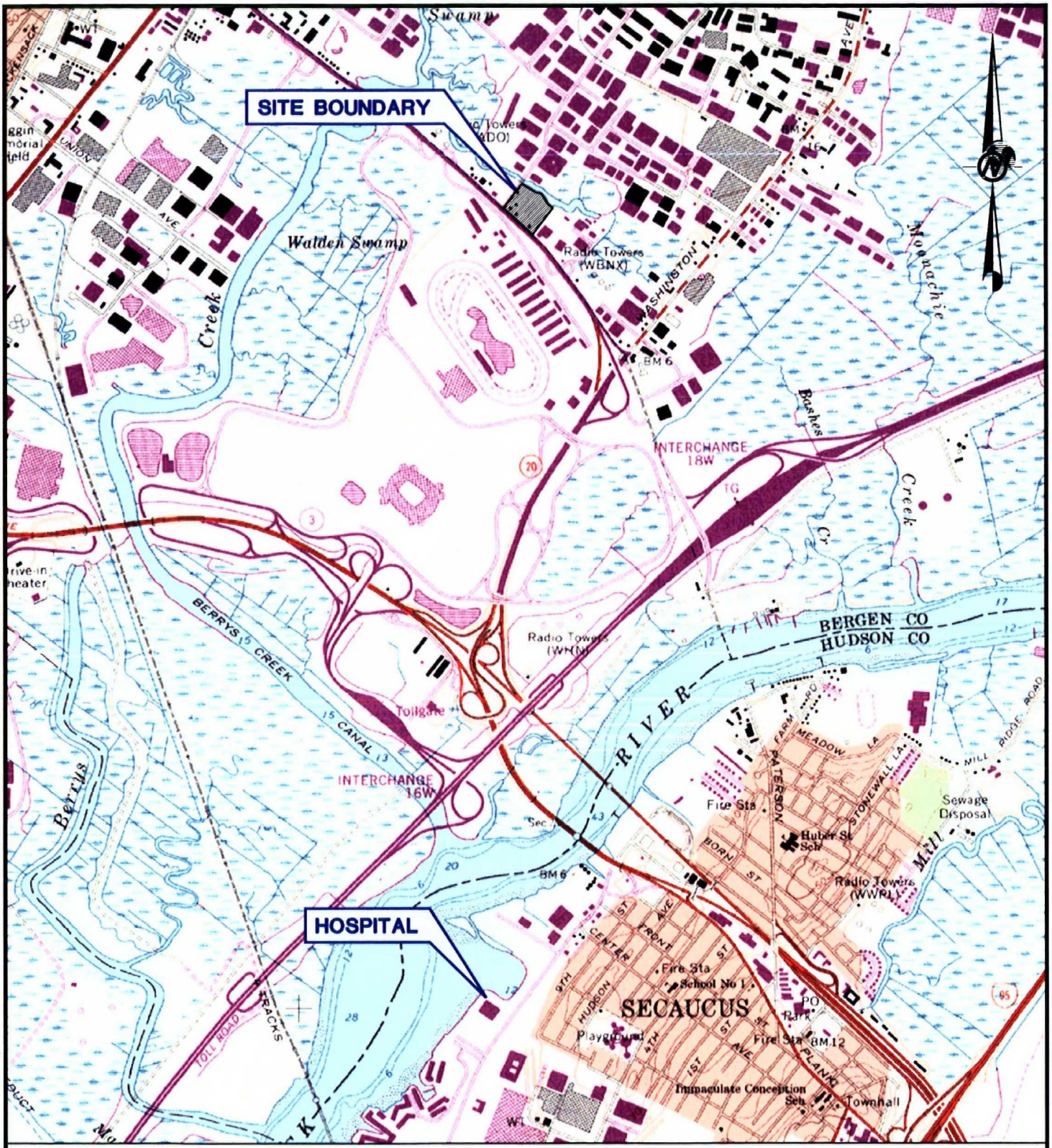
Table C4
Levels of Personal Protection and Upgrade Criteria
216 Paterson Plank Road Site

Task	Initial Level of Protection	Air Monitoring Equipment	Upgrade Criteria	Upgraded Level of Protection
Walk Through	D1	NA	Condition Dependent	Condition Dependent
Drilling	D2	MSA 361	LEL:>10%, <20%	Continue with Caution
			>20%	Temporarily cease work until concentration subsides and evacuate immediate area
			H2S:>10 ppm for more than 1 hour, or >15 ppm for more than 15 minutes, or >25 ppm at any time	Temporarily cease work until concentration subsides and evacuate immediate area or B
			O2: confined space entry <19.5%	Entry PROHIBITED or B
		PID	VOCs continuously greater than background, or >1 ppm above background for more than 5-minutes or any peak >10 ppm	C
			Continuously greater than 25 ppm, or frequent peaks greater than 50 ppm	Temporarily cease work until concentration subsides and evacuate immediate area or B
Drill Rig/ Equipment Decontamination	D1 plus Goggles or Faceshield, Gloves Rain suit	NA	NA	NA

Notes:

Condition Dependent: Personnel are to use prudent judgement and select additional PPE based on current Site conditions (e.g., wet or muddy) to prevent unnecessary contamination.

Site personnel are permitted, with HSO approval , to substitute protective aprons and/or gauntlets when exposure to water/sediment samples is readily controlled. This substitution is permitted to reduce the possibility of heat stress caused by working in full coverall protection.



REFERENCE

1.) BASE MAP TAKEN FROM U.S.G.S. 7.5 MINUTE QUADRANGLE OF WEEHAWKEN, NEW JERSEY, DATED 1967 AND PHOTOREVISED 1981.

2000 0 2000
SCALE FEET

NJ Authorization #24GA28029100

Golder Associates
Philadelphia USA

SCALE	AS SHOWN
DATE	04/01/05
DESIGN	SDM
CADD	AM
CHECK	SDM
REVIEW	RJI

FILE No. 9436222E008
PROJECT No. 943-6222 REV. 0

TITLE

SITE AND HOSPITAL MAP

216 PATERSON PLANK ROAD SITE

FIGURE C1

Drawing file: 9436222E008.dwg Apr 01, 2005 - 12:24pm

ATTACHMENT C1

FIELD PROCEDURES CHANGE AUTHORIZATION

Attachment C1

Field Procedures Change Authorization

Instruction Number: _____ Duration of Authorization Requested Date:_____

to be changed ___ Today only

___ Duration of Task

Description of Procedures Modification:

Justification:

Person Requesting Change: Verbal Authorization Received From:

Name	Name	Time
Title	Title	
Signature	Approved By	

(Signature of person named above to be obtained within 48 hours of verbal authorization)

ATTACHMENT C2

SITE HEALTH AND SAFETY PLAN ACKNOWLEDGEMENT

Attachment C2

Site Health and Safety Plan Acknowledgement

I have read understand and agree to follow the provisions detailed in the Health and Safety Plan for the 216 Paterson Plank Road Site.

I am aware of emergency procedures, equipment locations, and emergency telephone numbers.

I understand that my failure to comply with these provisions may lead to disciplinary actions and/or my dismissal from the Site.

Printed Name	Organization	Signature	Date

This form is to be kept on file on Site. Copies should be made available to personnel from all companies involved with Site work.

ATTACHMENT C3

REPORT FORM FOR UNSAFE CONDITIONS AND PRACTICES

Attachment C3

REPORT FORM FOR UNSAFE CONDITIONS AND PRACTICES

DESCRIPTION OF UNSAFE CONDITION OR PRACTICE _____

_____

_____

_____

_____

DESCRIPTION OF CIRCUMSTANCES SURROUNDING UNSAFE CONDITION OR PRACTICE _____

_____

_____

_____

_____

IS THIS AN EXISTING CONDITION OR POTENTIAL HAZARD? _____

REPORTED TO _____

REPORTED BY _____ **DATE** _____

COMMENTS _____

_____

_____

_____

_____

REPORT RECEIVED BY _____

DATE _____

ATTACHMENT C4

EMERGENCY NOTIFICATION NUMBERS

Attachment C4

EMERGENCY NOTIFICATION NUMBERS

Medical	**(201) 483-4300**	Carlstadt Emergency
Police	**(201) 483-4300**	Carlstadt Emergency
Fire	**(201) 483-4300**	Carlstadt Emergency
Hospital	**(201) 392-3100**	Meadowlands Hospital Meadowlands Park Seacucus, NJ
USEPA Project Manager	**(212) 637-3914**	Stephanie Vaughn (work)
NJDEP Project Manager	**(609) 633-0747**	Riché Outlaw (work)
Golder Remedial Design Project Manager	**(973) 621-0777**	Mark McNeilly, P.E. (work)
Golder Health & Safety Officer	**(856) 616-8166**	Marie Lewis (work)
U.S. EPA National Response Center	**(732) 548-8730 (24 hours)**	

ATTACHMENT C5

INCIDENT REPORT FORM

Golder Associates

ATTACHMENT C5

INCIDENT REPORT FORM

In the event of any injury, accident or illness requiring medical attention beyond minor first aid, please complete this form. Retain two copies for your files and send the original to Karen Dierst in the Seattle office.

Employee's office mailing address:

_____

_____

_____

_____

Location of office (if different):

_____

_____

_____

_____

EMPLOYEE INFORMATION:

Employee's name:_____

Length of time with Golder:_____

S.S.#:_____-_____-_____ Sex: M F Birth Date:_____

Home address:

_____

_____

_____

Occupation:_____

Department or group:_____

PROJECT INFORMATION:

Project number: _____ Project Manager: _____

Project short title: _____ Field Supervisor: _____

Project Description (briefly describe the project, location, employee's role, etc.):

_____

_____

_____

_____

_____

-over-

ACCIDENT/EXPOSURE INFORMATION:

Description of accident/incident (briefly describe how the accident/incident occurred, what task the employee was working on at the time, working conditions, etc.)

_____

_____

_____

_____

_____

INJURY/ILLNESS INFORMATION:

Description of injury/illness (please describe the nature of the injury/illness, body part(s) affected, and the object/agent which caused the injury/illness):

_____

_____

_____

_____

_____

Name and address of attending physician:

_____

_____

_____

_____

Name and address of hospital (if admitted):

_____

_____

_____

_____

Report prepared by:_____

Title:_____

Date:_____